THE JOURNAL OF PERIODONTOLOGY

October
1952

Published by
THE AMERICAN ACADEMY OF PERIODONTOLOGY
VOLUME 23
NUMBER 4

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The Journal of Periodontology
is dedicated to
Dr. Gillette Hayden
and
Dr. Grace Rogers Spalding
for their pioneer efforts and
selfless devotion in behalf
of periodontia and the
American Academy
of Periodontology

THE JOURNAL OF PERIODONTOLOGY
(J. Periodont.)

Published Quarterly—January, April, July, and October—By

THE AMERICAN ACADEMY OF PERIODONTOLOGY

Publication Office: 2620 FLETCHER ST., CHICAGO 18, ILL.
Editorial Office: 1121 WEST MICHIGAN ST., INDIANAPOLIS 2, INDIANA
Single copies of this number may be obtained from
Editorial Office at $1.50 each
Subscription Price $6.00
All foreign subscriptions to be paid in United States money

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The Journal of Periodontology, Vol. 23, No. 4, October, 1952. Published by the American Academy of Periodontology. Publication office, 2620 Fletcher St., Chicago 18, Ill. Editorial office, 1121 W. Michigan St., Indianapolis 2, Ind. Yearly subscription, $6.00. Single Copy $1.50. Entered as second-class matter at the post office at Chicago, Ill. Published quarterly. Copyright 1952 by the American Academy of Periodontology.

THE JOURNAL OF PERIODONTOLOGY is published to serve as the professional journal of periodontia; to keep dentists in touch with research being carried on in this field and related sciences; to stimulate greater interest in the supporting tissues of the teeth and their relation to oral and general health.

The Journal is the official organ of the American Academy of Periodontology and will contain, therefore, papers of scientific and clinical interest which are presented at the annual meetings of that society, as well as articles submitted direct to the Editor. Obviously opinions expressed do not necessarily represent those of the Editor or the American Academy of Periodontology.

Thirty-seventh Annual Meeting

THE AMERICAN ACADEMY OF PERIODONTOLOGY

September 4, 5, and 6, 1953

Cleveland, Ohio

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The American Academy of Periodontology

Dr. Roy O. Elam of 2102 West End Avenue, Nashville, Tennessee, was installed as the 1952-53 President of the American Academy of Periodontology at its 36th Annual Meeting in St. Louis, Mo. Dr. Elam's elevation to the Presidency climaxes a long and effective service to the American Academy of Periodontology and to organized dentistry. He has worked diligently as chairman of the important Constitution and Bylaws Committee of the Academy and the revision which was passed at the St. Louis meeting represented countless hours of Dr. Elam's time.

Dr. Elam has served as President of the Nashville Dental Society and the Tennessee State Dental Association and has been appointed on numerous committees of the American Dental Association, including the Council on Dental Education. Associated with him in his practice of dentistry in Nashville is his son, Roy O. Elam Jr., D.D.S.

The Academy is fortunate to have Dr. Elam as its President since he will be a capable and dignified leader.

THE JOURNAL OF PERIODONTOLOGY

OCTOBER, NINETEEN HUNDRED FIFTY-TWO

The Periodontal Pocket

by BERYL RITCHEY, B.S., D.D.S., AND BALINT ORBAN, M.D., D.D.S.,* *Colorado Springs, Colo.*

PERIODONTAL literature contains many references to the removal of the epithelium lining the pocket, to surgical resection of the epithelial attachment, to curettement of granulation tissue, to elimination of dead or infected cementum, and to osseous resection.[4, 10, 14, 18, 23] The impossibility of definitive operative techniques and the surgical risk involved in some of the recommended procedures warrant a review of the histopathology of a periodontal pocket.

The material used as the basis for this discussion of the microscopic anatomy of a typical periodontal pocket consists of a series of mesio-distal (frontal) sections through the interproximal space between a mandibular right first bicuspid and cuspid. The specimen was surgically removed from a healthy, fifty year old, white male; the gingiva was firm, pink, and well stippled. In Figures 1, 2, 3, 4, 6, 7, 8 and in Diagram I the bicuspid is shown on the left and the cuspid on the right. Identifying symbols used in the illustrations are X for the bottom of the pockets, XX to mark the deepest point of the epithelial attachment, O to denote the bundle of connective tissue fibers in Figure 5, and (X) to indicate areas of bone formation in Figures 9, 10, and 11.

MICROSCOPIC ANATOMY

The stratified squamous epithelium lining a periodontal pocket is non-keratinized and varies greatly in thickness; a shedding of surface cells is common. Epithelial ridges are often elongated and generally irregular. Close to the bottom of the pocket polymorphonuclear leukocytes may frequently be observed invading the epithelium; both intra and inter-cellular edema are common findings. In a labial section of this specimen, Figure 1, the pocket epithelium is seen to be relatively thick with elongated but rather regular ridges; on the cuspid side (right) the epithelium is very thin near the bottom of the pocket. Figure 2, a central section, shows a relatively thick epithelium for the full depth of the pocket on both teeth. A lingual section, Figure 3, exhibits a very thin pocket epithelium except near the crest of the papilla; the epithelial ridges are irregular and show a tendency toward proliferation.

The cementum above the bottom of an untreated pocket is always acellular and usually covered with a cuticle produced by the epithelial attachment; this

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cementum may be considered necrotic. Calculus or a materia alba are almost constant findings. From the bottom of the pocket to the deepest point of the epithelial attachment, the cementum shows no signs of vitality. Only in the area apical to the deepest point of the epithelial attachment may one see microscopic evidence of vitality in cementum; i.e., a newly deposited layer of uncalcified cementum lined by cementoblasts.

The most characteristic histologic features identifying the bottom of a periodontal pocket are the dental cuticle and the rough inner surface of the pocket epithelium, compared to the relatively smooth surface of the epithelial attachment. Pocket depth in this specimen varied from 0.4 to 3.1 millimeters. See Figures 1, 2, 3 and Diagram I. In the most labial section (Figure 1) the bottom of the pocket is seen to be on the enamel of the bicuspid and at the cemento-enamel junction on the cuspid. As is often the case, pocket depth in this specimen increased toward the lingual; in Figure 3 the bottom of the pocket is on the cementum of both teeth.

Decalcification of the specimen removes the enamel but calculus and cuticle often indicate the former enamel surface. Shrinkage of the gingival papilla during fixation produces the space seen between the papilla and the calculus. Calculus, if present, always extends to the bottom of the pocket.

The deepest point of the epithelial attachment tends to follow the contour of the bottom of the pocket. In sections shown in Figures 1, 2, 3 and Diagram I, the length of the epithelial attachment varies from 0.4 to 1.7 millimeters. In a section cut just lingual to the center of specimen (Figure 4) the epithelial attachment terminates in a resorption lacuna in the

Fig. 1

Figs. 1, 2, 3. Low power photomicrograms of sections taken, respectively, from the labial toward the lingual portion of the specimen. X—Bottom of pocket. XX—Deepest point of epithelial attachment. See Diagram I for actual measurements.

Fig. 2

Fig. 3

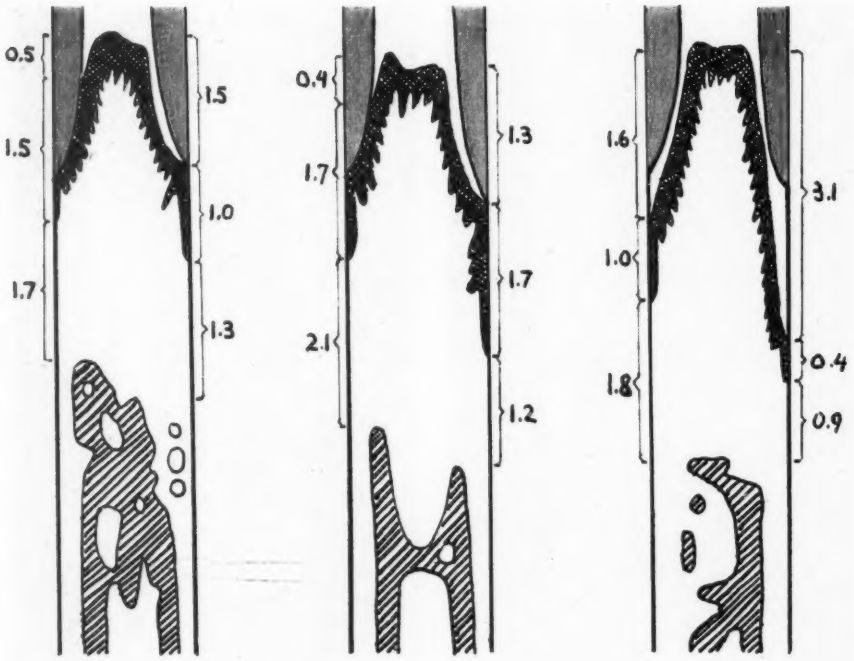

Diagram 1

Drawing showing relationship between pocket depth, length of epithelial attachment, and distance from deepest point of epithelial attachment to the alveolar crest. The measurements used were taken from the sections shown in Figures 1, 2, 3.

dentin; the length of this epithelial attachment is 1.8 millimeters on the bicuspid and 0.9 on the cuspid. Figure 5 is a higher magnification of this same area; the apparent interruption in the attachment indicates that the epithelium is surrounding a resistant fiber bundle. A higher magnification of the extremely thin bone spicules forming the alveolar crest in Figure 4 are shown in Figure 11.

The connective tissue below the bottom of this pocket is seen to be the site of a chronic inflammatory reaction which extends to, and beyond, the crest of the alveolar bone. The inflammation in the labial section (Figure 1) is rather sharply localized in the papilla, apparently limited by the heavy transseptal fibers extending from the deepest point of the epithelial attachment to the bone; between the fiber bundles a few inflammatory cells may be seen to have penetrated to the alveolar crest. Figure 2 shows fibers badly disorganized; only a few bundles remain, and they appear to go only a third or a half way across the space; here the inflammatory cells penetrate deep into the bone along the nutrient canal. The connective tissue bundles in the lingual section (Figure 3) have completely disappeared, and the entire interdental space above the alveolar crest is densely infiltrated. Groups of inflammatory cells are seen in both the marrow spaces and in the area normally occupied by the periodontal membrane. Higher magnifications of the alveolar crest area of these same sections are shown in

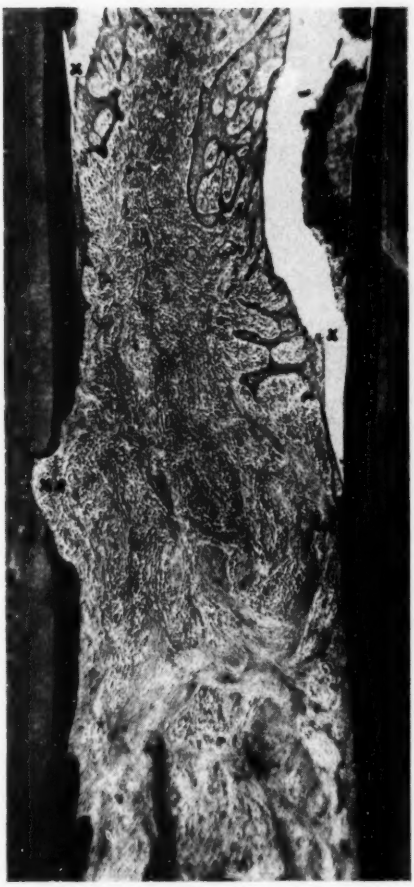

Fig. 4

Fig. 4.—A medium power photomicrogram of the supra-alveolar region of a section cut just lingual to the center of the specimen. The alveolar margin consists of extremely thin spicules. A slight resorption is seen on the root surface on the left side. X—Bottom of pocket. XX—Deepest point of epithelial attachment.

Fig. 5

Fig. 5. A high power photomicrogram of the resorption in the dentin shown in Figure 4. The deepest point of the epithelial attachment (XX) extends into a resorption lacuna; it is interrupted at its base by a bundle of connective tissue fibers, (O).

Figures 6, 7, 8. Labially (Figure 6) the inflammation is rather closely restricted to the bay-like depression at the alveolar crest; it extends only slightly into the marrow spaces along the course of the blood vessels. In the center of the specimen (Figure 7) the inflammation is much more extensive and an inflammatory infiltrate fills the entire nutrient canal. Above the alveolar crest islands of inflammatory cells occupy wide spaces between fiber bundles, but the inflammation does not extend into the periodontal membrane. Toward the lingual (Figure 8) the inflammatory cells occupy wide spaces of the former bone marrow and periodontal membrane.

Some inflammatory elements extend into the periodontal membrane on the cuspid side.

This specimen is representative of the character of alveolar bone in a periodontal pocket and typifies the relationship of the bottom of the pocket, the deepest point of the epithelial attachment, and the crest of the alveolar process. In these slides the distance from the bottom of the pocket to the alveolar crest varies from 1.3 to 3.8 millimeters (Diagram I). It is of importance to notice, though this study is limited to a single interproximal space, that there is a striking difference in the configuration of the alveolar bone as the sections progress from labial to lingual. In Figure 6 (high power of Figure 1) the alveolar crest is formed by a solid column of bone with a bay-like depression at the crest; marrow spaces and large canals are visible throughout. On the cementum of the bicuspid there are a number of small resorptions repaired by cementum apposition. Typical bundle bone is shown on the distal surface of the cuspid. On the mesial surface of the bicuspid there are resorption lacunae and open marrow spaces commonly found on the side toward which a tooth is moving. The marrow in the alveolar crest is edematous; apically it has a fatty appearance. Large blood vessels are seen in all sections. The alveolar bone in Figure 7 (high power of Figure 2) is entirely different in its configuration; the margins are separate lamellae, thin and sharp. The cementum on the mesial of the bicuspid shows extensive resorptions repaired by apposition of new cementum; a few cementicles are attached to the surface. In Figure 8 (high power of Figure 3) the alveolar margin consists of one thin lamella and a few, seemingly isolated, bone spicules. Resorption of cementum is extensive but has been repaired by new cementum. A few cementicles lie in the periodontal membrane.

High magnification of alveolar crest areas in this specimen are shown in Figures 9, 10, and 11. The apical margin of the bone spicule forming the alveolar crest in Figure 9 is separated from the rest of the bone by a densely infiltrated loose connective tissue. The inflammatory infiltrate consists mainly of plasma cells and lymphocytes. Most of the surface of the bone exhibits active bone formation, evidenced by the presence of an uncalcified layer of bone lined by osteoblasts. Some areas show heavy reversal lines, formed after resorption had ceased and new bone formation started. The tip of one of the spicules in Figure 9 consists of a bundle bone; most of the osteocytes are vital. In Figure 10 a thin spicule of bone presents a surface showing alternating areas of arrested resorption and new bone formation. The osteocytes are vital. There are a few periodontal mem-

Fig. 6

Fig. 6. High magnification of alveolar crest shown in Figure 1.

Fig. 7

Fig. 7. High magnification of alveolar crest shown in Figure 2.

Fig. 8

Fig. 8. High magnification of alveolar crest shown in Figure 3.

These three figures demonstrate the variations in alveolar bone architecture from labial to lingual and show the route followed by the inflammatory process from the bottom of the pocket into the alveolar bone.

brane fibers attached to this spicule, and it is surrounded at its tip by a fibrous connective tissue. In adjacent parts there is a plasma cell infiltration. Figure 11 shows the tip of the thin alveolar bone plate referred to in Figure 4; every osteocyte in this trabecula is vital. A heavy osteoid layer is present on both sides of the spicule—evidence of active bone formation. On the right side bone is being formed on the surface of a heavily stained resting line. On the left side the new formation of bone follows a reversal line. The bay-like indentation at the crest indicates a previous resorption, now reversed into apposition.

The periodontal membrane in this specimen is typical of that seen in any mild periodontitis. An increase in width in one area is occasioned by three large epithelial bodies (Figures 1 and 6). The presence of epithelium in the periodontal membrane is an almost invariable finding, but remnants of this size are not frequently observed. Inflammation usually does not penetrate directly from the gingival margin to the periodontal membrane[29]; it tends to follow the course of the blood vessels as shown in Figures 6 and 7. When inflammatory cells are seen in the periodontal membrane (Figure 8) they occur either in areas where

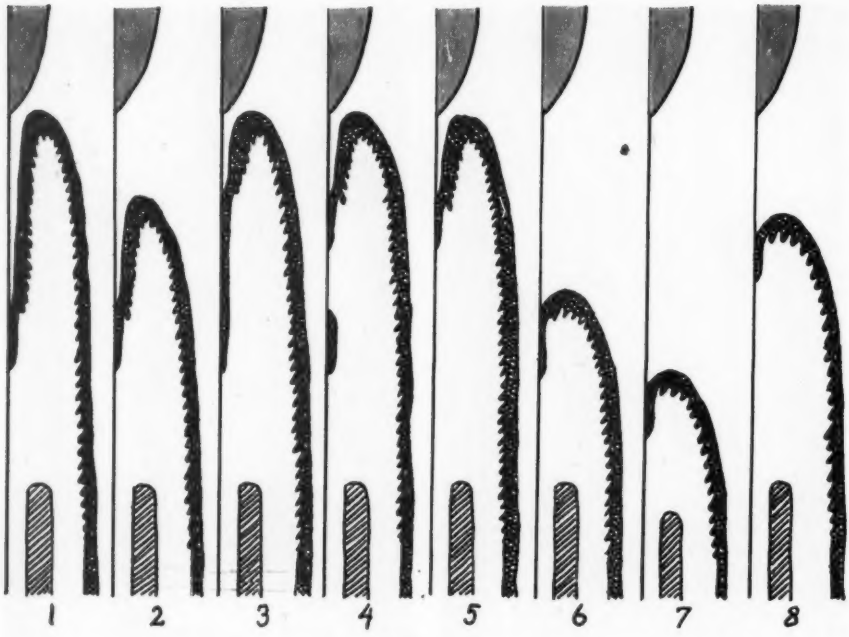

Diagram 2

Schematic comparison of an untreated periodontal pocket (Drawing 1) and a number of hypothetical postoperative results (Drawings 2-8).

the alveolar bone has been largely destroyed or in an area made accessible by a branch of the nutrient canal.

DISCUSSION

The evaluation of the many papers of scientific and clinical interest in our literature is a difficult but inescapable obligation imposed on every periodontist. A knowledge of the histopathology of the periodontium, clinical experience, and an unemotional objectiveness are essential for the choice of rational therapeutic procedures.

In this discussion it is assumed that the removal of calculus, the elimination of other local mechanical irritants, and adequate instruction in home care are included in all forms of treatment. It is also assumed that pocket elimination is usually the goal toward which treatment is aimed and that elimination of the pocket should be accomplished with the least possible damage to the supporting tissues. Pocket elimination with a postoperative increase in the length of the clinical root would obviously be the ideal.

To reduce to a minimum any misunderstandings in terminology, the discussion will refer either to Diagram I and the photomicrograms already described, or to Diagram II which is a schematic comparison of an untreated periodontal pocket (Drawing 1) and a number of hypothetical postoperative conditions (Drawings 2-8).

If treatment consists only of the removal of calculus and the planing and polishing of the denuded root surface. the utmost

that may be expected is whatever pocket reduction results from the elimination of an inflammatory swelling or from a slight marginal atrophy. There would be no possibility of an attachment between the epithelium of the gingival wall and the root surface (Drawing 2, Diagram II).

A second method of approach includes calculus removal and root planing but adds to it a subgingival curettage, aimed at the removal of the epithelium of the pocket wall. Drawings 2, 3, and 4 in Diagram II show three possible end results. If no reattachment is achieved, the result would be a slight reduction in pocket depth by atrophy of the curetted gingival wall but no change in the length of the clinical root (Drawing 2, Diagram II). If attachment by epithelium occurs, there would be a crownward addition to the preoperative epithelial attachment with the result as shown in Drawing 3. Still more favorable would be the result in which some attachment by connective tissue occurs between the old and the new epithelial attachment (Drawing 4).

A third approach adds surgical removal of the epithelial attachment to calculus removal, root planing, and pocket wall curettage. The perfect end result would be as shown in Drawing 5, Diagram II. Connective tissue would replace the preoperative epithelial attachment and extend some distance toward the crown; the position of the new epithelial attachment would be well coronal to the bottom of the preoperative pocket. Complete, or even partial, success would increase the length of the clinical root (Drawings 3 and 4); however, this form of treatment introduces a surgical risk. A complete failure would result in a new epithelial attachment in a more root-wise position, and the end result would be a decrease in the length of the clinical root—an irreparable loss.

A fourth form of treatment is that of gingivectomy at the bottom of the pocket with an end result as shown in Drawing 6, Diagram II. This procedure assures complete elimination of the pocket without any possibility of damage to the preoperative epithelial attachment or its supporting connective tissue. The postoperative clinical root cannot be shorter than that which was presented for treatment. Operative procedures are definitive and not extremely difficult; the clinical result is predictable.

Gingivectomy below the bottom of the pocket plus curettement of the so-called granulation tissue would constitute a fifth method of treatment with the end result being that shown in Drawing 7, Diagram II. There would be complete pocket elimination, but the epithelial attachment and the alveolar crest would be farther apically than before treatment, the end result being a decrease in the length of the clinical root.

It has been reported[9] that a postoperative result as shown in Drawing 8, Diagram II has been achieved following extensive gingival resection and curettage of the normal periodontium in experimental animals.

It would seem that there are only two possible objections to treatment limited to the removal of calculus and the planing of the denuded root. Some[10] might object on the basis that an attempt should always be made to increase the length of the clinical crown, i.e., to get some type of reattachment. The other objection is that the treatment does not always result in complete elimination of the pocket. There is no intention to imply that the removal of calculus and root planing is an easily accomplished treatment. In fact, it is an extremely demanding one.

Therapy that includes curettage, whether of the pocket wall or extended to include the epithelial attachment, is a rational procedure only if reattachment by epithelium or by epithelium and connective tissue is a possibility.

Curettement of the soft tissue side of the pocket in expectation of an epithelial attachment should include the removal of the entire pocket epithelium, the new

epithelial attachment being accomplished by a proliferation of basal cells from the gingival margin. Hope for an organic union between root and pocket epithelium is certainly a faint one; the only possibility of success would require the surgical exposure of an intact basal cell layer—an unimaginable accomplishment.

The cementum above the bottom of the pocket and that covered by the epithelial attachment may be considered nonvital. Planing can at best leave the surface smooth and free of bacterial plaques; the exposed root surface will still be nonvital unless dentin has been exposed. This fact does not eliminate the possibility of attachment; both epithelial and connective tissue attachments have been observed on necrotic bone, cementum, dentin and even on odontomas.[12, 16, 21, 25, 30] Every successful bone graft and every successful tooth replantation is a demonstration of soft tissue attachment to a nonvital surface.

Reattachment following curettement above the bottom of the pocket is not a question of possibility but rather of probability. The inadequacy of the blood supply in chronically inflamed gingiva, the difficulty of protecting the clot against oral bacteria, and the rapid rootwise proliferation of marginal epithelium all tend to reduce the chances of success.[22] Histologic confirmation of clinical success is meager, and it is our opinion that results do not justify the effort involved.

The removal of the epithelial attachment is advocated by a number of workers.[3, 4, 7, 8, 10, 15, 23] Glickman's recommendation[10] is emphatic and without reservation: "It would appear that regardless of whether the surgical or non-surgical methods of treatment for pocket eradication are used, the epithelial attachment should be removed....." In describing gingivectomy Ramfjord[23] is equally unequivocal: "..... the epithelial attachment should be removed throughout its entire extent....." In sharp contrast to the lack of damage that results from failure to achieve reattachment after curettage above the bottom of the pocket, *a failure to get reattachment following curettement of the epithelial attachment will shorten the clinical root.* There is always a danger that epithelial proliferation along the pocket wall will predominate over attachment; inflammation is an ever present deterrent to favorable end results. In addition to the biologic gamble the removal of the epithelial attachment presents an operative problem.

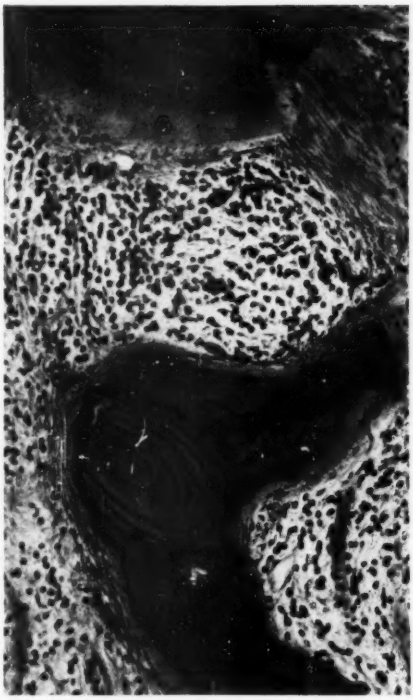

Fig. 9

What is there to guide the operator who chooses to go beyond the bottom of the pocket? How could he know when he had accomplished the task to which he had set himself? This specimen, and it may be considered typical, shows a variation between 0.4 and 1.7 millimeters in the length of the epithelial attachment in a single inter-

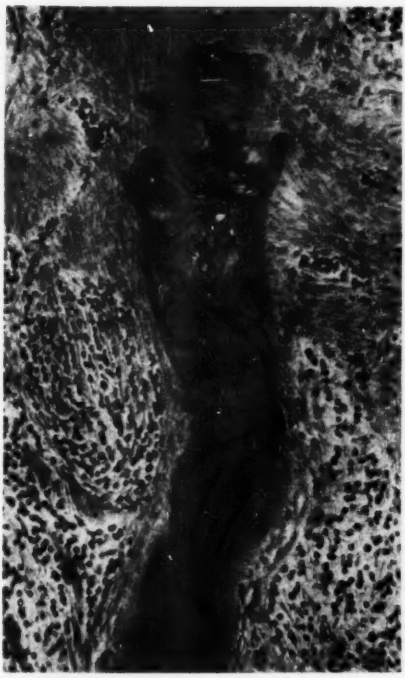

Fig. 10

Fig. 11

Figs. 9, 10. High magnification of alveolar crest areas showing formation of bone (X) in the presence of a rather extensive inflammatory reaction.

Fig. 11. High magnification of area shown in Figure 4. (X)—areas of bone formation.

proximal space (Diagram I). What this variation might be is not a matter of record, nor could any figure be acceptable as an average upon which to base an operative technique. It is obvious that a surgical curettement of 0.5 to 1.0 millimeters, as recommended by Ramfjord[23] on the basis of his Rhesus monkey experiments, would fall short of accomplishing the desired result in the human periodontium.

Figures 1 and 2 show relatively shallow gingival pockets but demonstrate that it would be necessary to go one and seven-tenths millimeters beyond the bottom of the pocket to remove all of the epithelial attachment. In Figure 4 the epithelial attachment on the bicuspid extends almost two millimeters beyond the bottom of the pocket. In a case similar to that shown in Figure 4 the operator, desiring to remove all of the epithelial attachment, would have to go two millimeters beyond the bottom of the pocket on the mesial of the bicuspid but only nine tenths of a millimeter on the distal surface of the cuspid.

Perhaps heavy transseptal fibers (Figure 1) might be a dependable operative landmark in some cases, but there would be very little possibility of guidance from fibers in areas similar to those shown in Figures 2 and 3. The problem of completely removing the epithelial attachment becomes an even more complicated clinical problem when it is realized that the condi-

tion shown in Figure 4 is not an uncommon one. Here the epithelium does not stop on the cementum but extends into a resorption lacuna in the dentin two millimeters beyond the bottom of the pocket; and, at its base, it is protected from the operating instrument by a dense bundle of connective tissue fibers. In areas where there is no possibility of guidance from fiber bundles, it is unlikely that bone spicules as fine as those shown in this figure (4) could be expected to provide perceptible resistance to a resecting instrument.

The presence of epithelial rests in the periodontal membrane would be of clinical significance if they should occur at about the point of curettement. In Figures 1 and 6 three large epithelial masses lie close to the point where curettage might be performed. It is entirely possible that these epithelial rests would proliferate as a result of the irritation of the operative procedures. At the site of a periapical inflammation epithelial rests often proliferate and attach themselves to the root surface; a similar response here would produce a rootwise increase in the length of the epithelial attachment—just the opposite of the desired result.

Although reattachment to surgically exposed cementum in the Rhesus monkey has been reported following removal of the epithelial attachment,[24] it is questionable whether one should permit himself to imply that a similar result could be expected in human tissues especially when the cementum has been denuded by periodontal disease.

Histologic confirmation of crownward reattachment in clinical practice is lacking, but testimony of success is not infrequent.[1,2,5,17,19,27] The so-called "intrabony" pocket[11] offers the best opportunity for success in this form of therapy. As a routine procedure the risk of a rootwise reattachment appears to us to outweigh the probabilities of success; careful selection of the case by an experienced operator is a prerequisite.

Treatment aimed at the removal of all so-called granulation tissue below the bottom of the pocket[4,14] presents both a mechanical and a biologic problem. How may one, dedicated to this procedure, know that he has completed his mission? Below the bottom of the pocket there are only two possible landmarks: either strong transseptal fibers or the alveolar crest. In the illustrations it is evident that transseptal fibers are not always present. In cases of severe inflammation it might be argued by some[4,6,13,14] that an operator would be justified in removing all soft tissue between the bottom of the pocket and the alveolar crest, but even the alveolar crest does not constitute a suitable landmark. If all cases presented a crest as is shown in Figure 1, the bone would provide enough resistance to signal the end of the operation, but the spicules shown in Figures 3 and 4 could not be expected to offer perceptible resistance to a curetting instrument. Even a resistant alveolar crest would not be a dependable landmark for the removal of all inflamed connective tissue because the inflammatory process often penetrates deep into the nutrient canals.

The inflammatory reaction in the periodontium is a response to toxins originating in the gingival pocket; when the pocket is eliminated the defensive features of the inflammatory process begin to subside, and the reparative features predominate until repair has been effected. Curettement of inflamed connective tissue below the bottom of the pocket (the so-called granulation tissue) may result in a more rapid healing, but at the expense of having sacrificed the most likely source of new fibers and of new bone.

LANDMARKS

Regardless of the type of treatment that is instituted, there should be dependable landmarks to guide the operator. No roentgenogram can provide more than a vague outline of the alveolar crest, and certainly there can be no roentgen evidence at all of the epithelial attachment. The gingival margin is the only landmark that is clinically visible. The bottom of the pocket is

the only other available guide; it can be located by probing, measured, and recorded. This specimen demonstrates that in a single interproximal space there may be a great difference in the depth of the gingival pocket. On the bicuspid, left side, (Figures 1 and 2) the pocket is 0.4-0.5 millimeters deep; in Figure 3 on the same tooth the pocket is 1.6 millimeters in depth. On the cuspid, right side, (Figure 1) the pocket depth is 1.5 millimeters; while in Figure 3 the pocket depth on the same tooth is 3.1 millimeters. It is a common experience to find the pocket deeper on the proximals than on either the labial or lingual surfaces. If the bottom of the pocket is to be used as a landmark, it is necessary to plot its depth around the entire circumference of the tooth.

The bone changes exhibited in this biopsy specimen are representative of those found in most inflammatory periodontal conditions. The histologic evidence does not lend credence to treatment that involves the removal of any bone on the basis that it is decalcified,[4] infected, or necrotic.[20, 28] Active bone formation (Figures 9, 10, 11) may occur even in the presence of a rather severe inflammation. The retention of every spicule of bone would seem to provide the best opportunity for the regeneration of the alveolar crest at the most coronal position possible. The sacrifice of some bone is sometimes recommended in an attempt to establish a contour more amenable to good hygiene, but even in these cases it is doubtful if the sacrifice is justified.

Gingivectomy at the most coronal point of the epithelial attachment assures complete pocket elimination and provides ready access for the thorough debridement and polishing of denuded root surfaces. In this procedure there is no surgical interference with the existing epithelial attachment. The preservation of all connective tissue below the bottom of the pocket permits the maximum in bone regeneration. There is no possibility that gingivectomy at the bottom of the pocket could result in a less favorable condition than that which existed prior to treatment. Although zero pocket depth is our ideal, gingivectomy could be safely performed at any point between the gingival margin and the bottom of the pocket; the result would be an improvement accomplished without danger of making a bad situation worse.

It should perhaps be emphasized that this conception of gingivectomy is a very different procedure than the "surgical resection of the gingival wall" described by Leonard[18] as follows: "The operation at its best is a combination of contoured resection of gingiva, *curettage of all epithelial attachment and bits of soft granulating tissue*, . . . " (Italics ours)

Gingivectomy below the bottom of the pocket and curettage of connective tissue below that point could aptly be called radical treatment. Number 8 in Diagram II is a hypothetical end result as reported by Glickman and Lazansky[9] following a surgical wound in a healthy periodontium of the dog; no such result has ever been reported following therapy of a periodontal pocket in man.

CONCLUSIONS

1. It is essential to the progress of periodontal therapy that every effort be directed toward developing procedures that would assure pocket elimination accompanied by an increase in the length of the clinical root. Experimentation with surgically produced pockets in animals is a valuable feature of research in periodontology, but recommendations for the clinical application of any therapeutic procedure based on such studies should be accepted with reservation unless supported by histologic evidence of routine success in practice. Animal experimentation is one thing; a precise clinical procedure with a predictable end result for the treatment of periodontal disease in man is quite another.

2. If the treatment of choice consists of the removal of calculus and planing of the root surface with or without curettage of

the soft tissues above the bottom of the pocket, there may be instances in which complete pocket elimination would require gingivectomy as a supportive measure.

3. The removal of inflamed connective tissue (granulation tissue) below the bottom of the pocket is an unwarranted sacrifice. No operative landmarks are available for determining the extent of the inflammatory changes. The defensive features of inflammation in the periodontium can be expected to subside following pocket elimination; the reparative features of the inflammatory response are an indispensable ally in healing and repair.

4. The bone forming the alveolar crest in periodontal disease is vital; only in rare cases would it seem logical to remove any of it.

5. Interference with the epithelial attachment involves a very real surgical risk; failure results in a shortened clinical root. The lack of dependable operative landmarks precludes the possibility of a definitive surgical technique. Recommendations for the use of this procedure should be supported by histologic evidence of routine clinical success in the treatment of periodontal disease in man.

6. Complete pocket elimination with the conservation of the existing epithelial attachment and all supporting connective tissue can be accurately and safely accomplished by gingivectomy at the bottom of the pocket.

SUMMARY

1. The microscopic anatomy of a periodontal pocket was presented.

2. The surgical risk and the operative problems involved in the resection of the epithelial attachment or the curettement of inflamed connective tissue below the bottom of the periodontal pocket were discussed.

3. Opposition was voiced against surgical interference with the epithelial attachment pending the presentation of impressive histologic evidence of clinical success.

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Mouth Rinsing

by FRANK G. EVERETT, M.S., D.M.D., M.D., AND M. MONTE BETTMAN, D.M.D., F.A.C.D.
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THE dental literature contains many articles describing the various benefits to be derived from regular and proper home care of the teeth. Aside from esthetic considerations, these benefits lie in the reduction of the incidence of dental caries[1,2] and in the prevention and therapy of periodontal disease.[3,4,5,6,7,8]

An important tool for proper dental home care is the toothbrush. A number of methods of toothbrushing have been described and toothbrushes in many shapes and with various tuft arrangements are commercially available. The toothbrush is used primarily to loosen dental plaques, materia alba and other debris clinging to the surfaces of the clinical crowns.[9] Most periodontists contend that massage of the gingival tissues with the toothbrush is also beneficial.[4,10,11] Use of dental tape, toothpicks and of rubbertip stimulator may also be beneficial in selected cases.

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Another aspect of home care that has received a great deal of attention is the composition of the dentifrice to be recommended in the different conditions by the dentist.[4,12,14] It is the primary function of the dentifrice to aid in the removal of debris by the detergent action of mild abrasives incorporated in the dentifrice, and by the added physical effect of foaming.

Relatively little consideration has been given in the literature to a third and important phase of home care, namely an exact description of a correct method of mouth rinsing.

Any observing practitioner of dentistry asking his patients to rinse their mouth after cleaning their teeth with a, let us say, pink-colored paste containing a fine abrasive, has at times been impressed with two observations. The first is the peculiar rituals patients go through when asked to rinse their mouth. These differ from patient to patient and range from the most common way of throwing the water from

one cheek into the other, to the somewhat rarer individual who thinks the best method of rinsing one's mouth is taking a sip of water and then shaking one's head violently from side to side. That these methods of rinsing are not fully effective is best demonstrated by checking how much of the rose-colored cleaning paste is left between the patient's teeth after he has rinsed his mouth. It is well known that in most, or at least in a great many instances the patient's teeth, particularly the interdental spaces are still coated with the pink material after the patient has finished the ritual he considers rinsing his mouth.

It has been stated correctly,[9] that rinsing one's mouth has an important and definite place in oral hygiene, just as the use of toothbrush and of dentifrice. The toothbrush with the help of the dentifrice loosens up plaques and materia alba and, undoubtedly, is instrumental in the elimination of a part of this material. However, this material has to be ultimately removed from the teeth, particularly from their interproximal surfaces by rinsing, or else the debris, though loosened by the action of the brush, will again settle on the surface of the tooth, as best indicated in the dental chair by the inability of patients to remove debris and cleaning-paste from their mouth due to ineffective rinsing.

TECHNIQUE

The following technique is suggested to those patients that have suffered some shrinkage of the interdental papillae. However, vigorous mouth rinsing is an important measure of home care in people of all age groups, with and without periodontal disease. After thorough brushing of the teeth, the patient takes a small sip of water into his mouth. Next he is instructed to close his mouth with his teeth kept apart slightly. Both upper and lower lip are then curled tightly around the incisal edges of the upper and lower teeth respectively. Next, the water is forced from the cavum oris proper through the interdental spaces between the front teeth into the vestibulum by expelling it with the tip of the tongue, which is raised almost to the palate. At the time of expulsion of the water a slight approximation of upper and lower teeth occurs, which serves to increase the pressure in the cavum oris proper. The water is then returned from the vestibulum again through the interdental spaces to the cavum oris proper by the contraction of upper and lower lip, and then alternately flushed back and forth through the interdental spaces of this region by the coordinated movement of lip and tongue. Different areas of the mouth are rinsed in the same manner by raising to the palate the part of the tongue adjoining the area to be flushed, and thereby expelling the water through the interdental spaces; this is again followed by rinsing back and forth through coordinated interplay of lips, cheeks and tongue. The entire mechanism is similar to the one used by some people who blow air through their interdental spaces. As a matter of fact, it is easiest to teach this method of mouth rinsing to the patient by demonstrating and practicing first with the use of air, and next only with water. The patient is then asked to finish rinsing his mouth by the customary flushing of water from cheek to cheek; this part of the rinsing procedure will help in clearing loosened debris from the buccal, labial and lingual surfaces. We then request the patient to spit out, to take another small sip of water, and to repeat the rinsing procedure.

TAP WATER ADEQUATE

It might be appropriate here to add a few words concerning the liquid to be used for mouth rinsing in home care; it is our opinion that tap water of mouth temperature is all that is required. Except in conditions of established pathology, no medication is necessary. We wish to warn particularly of the indiscriminate and long-continued use of Hydrogen Peroxide solution and most other oxygen liberating drugs for purposes of mouth rinsing in

home care; such abuse may lead to sponginess of the gingivae, the formation of hairy tongue,[13] to decalcification of tooth substance[14] and, in our experience, to hypersensitiveness of exposed root surfaces. Patients suffering from necrotizing ulcerative gingivitis who are given oxygen liberating drugs to be used as mouth wash in dilute form for home care during the period of treatment should be specifically instructed to discontinue the use of this drug, after healing, that is after two weeks at the most.

We feel that correct mouth rinsing is a most essential part of periodontal care and should therefore be included in consideration, and receive adequate attention in any program of caries prevention by home care measures.[2]

If preceded by adequate toothbrushing, the method described, when properly performed, will give the patient the benefit of truly clean teeth. We will have prevented the resettlement on the surfaces of the teeth, particularly in the embrasures, of material only loosened but not removed by the preceding correct use of the toothbrush.

SUMMARY

1. Some aims and methods of correct home care of the teeth are set forth briefly.

2. A method of mouth rinsing is described.

3. Methods of caries inhibition that encourage rinsing the mouth are, we feel, best from the periodontist's point of view.

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Case Reports

Elimination of Abnormal Occlusal Stress as a Factor in Healing and Repair of the Periodontal Structures

by J. C. WESTBROOK, JR., D.D.S., *Birmingham, Alabama*

IT IS generally accepted that traumatic occlusion is one of the most prevalent local factors causing injury to the periodontal tissues. The extent of the injury is governed by the amount, direction and frequency of the force applied and the ability of the periodontium to withstand this force.

In some cases the general state of health may be improved and the resistance increased but in the main, the periodontist must rely on local treatment to gain and maintain health, function, and the prolonged retention of the masticatory mechanism.

One of the most important links in the chain of treatment, particularly from a standpoint of the longevity of the teeth, is establishing the most ideal occlusion practical for each case.

While the change from a pathological to a physiological occlusion is not a panacea in the treatment of periodontitis and does not eliminate the infected pocket, it does make possible the successful treatment and retention of teeth otherwise hopelessly involved.

In order to establish this most nearly ideal occlusion, it is at times necessary to enlist the aid of orthodontic and reconstructive operative procedures. However, it is the rare case which cannot be brought to a fair degree of normalcy by judicious grinding and reshaping the teeth. By normalcy is meant a sufficient number of teeth striking simultaneously in centric jaw relationship with such cusps and fossa contacts that permits the maximum number of teeth to receive uniform pressure over the widest possible range in the eccentric movements of the mandible. This implies free jaw movement as directed by the musculature rather than the incline planes of the teeth and is stimulating rather than destructive to the periodontal tissues.

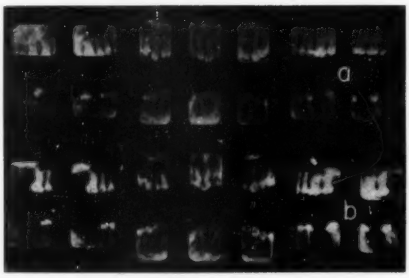


Fig. 1. Full mouth radiographs of Case #1. a) taken June 1944 and b) taken June 1951.

CASE REPORT #1

A white female, age forty, presented with marked periodontal destruction, supperation, and mobility, particularly in the lower left lateral through the first bicuspid, upper left first bicuspid and upper right

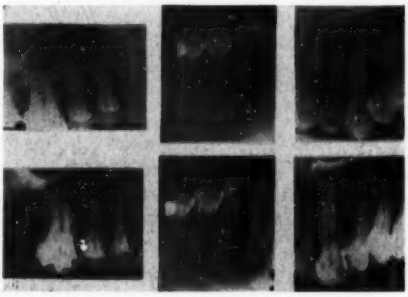


Fig. 2. Areas of Case #1 showing most bone resorption. The upper radiographs were taken in June 1944, and the lower ones June 1951.

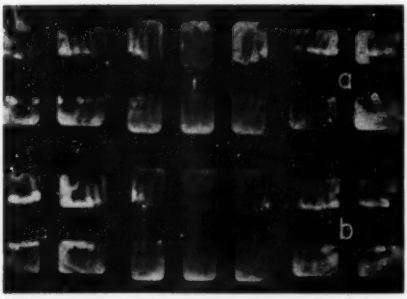
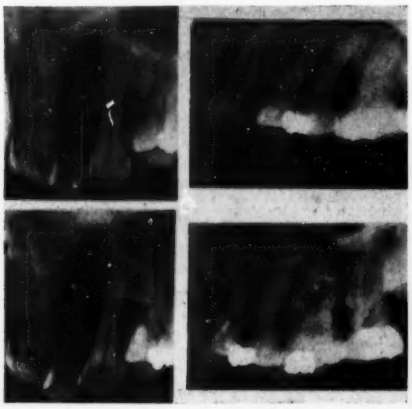


Fig. 3. Radiographs of Case #2. a) taken August 1943 and b) taken June 1951.

cuspid (Fig. 1, Fig. 2). The left second molars were considered hopeless and were extracted leaving no molars in the lower left segment. Her medical history revealed nothing of significance except a slight general debility and with the exception of dietary suggestions no general treatment was instituted. She had a rather deep overbite and her occlusion was traumatic in both centric and eccentric relations. Local treatment consisted of subgingival curettage, gingivectomy in some areas, occlusal correction by reshaping and instructions in home care. A gradual improvement was noted over a several month treatment period with repeated curettage and occlusal correction. Since the first year she has had prophylactic treatments which included further curettage and occlusal adjustments twice a year. Improvement has been consistent over a seven year period until at present there is very little mobility and successful maintenance of healthy tissues. There has been no change in the removable bridge since it was inserted during the original treatment period (Fig. 1, Fig. 2).

Fig. 4. Areas of Case #2 showing most bone resorption. Top radiographs taken August 1943, and lower ones June 1951.



CASE #2

This case of a white female, age thirty-five, is quite similar to case one, particularly in the respect of a deep overbite and very weak support in cuspid area. This included from upper right lateral incisor through upper right second bicuspid (Fig. 3, 4). It seemed impossible to get sufficient relief at first even with marked grinding and bevelling the cuspid and the response was not entirely satisfactory.

There was continued mobility and further bone resorption partly due to intermittent periods of bruxism. Treatment was started in 1943 and for the past two years the occlusal relief seems to be adequate for reasonable stability and stable support (Fig. 3, 4).

CASE #3

A white female, aged 36, was referred

Fig. 5. Case #3. This illustrates patient's maximum closure in centric jaw relation due to extruded upper molar.

Fig. 6. Case #3. Marked trauma of lower right lateral and cuspid resulting in marked mobility and sequestration.

with a generalized periodontitis. She had a most marked centric interference due to abnormal eruption of the upper left third molar (Fig. 5). The second and third molars were both extracted along with the upper and lower right second molars and some subgingival curettage was begun. Treatment was discontinued due to a very serious operation. She next presented two years later with marked swelling and pain in the lower right cuspid and lateral area (Fig. 6). This had been present for several weeks. Sequestration was suspected and proved to be the case between the lateral and cuspid. There was no history of a recent injury and the only etiologic factor apparent was marked trauma in both the convenience—so-called centric occlusion—right lateral and protrusive relations. There was excessive mobility of both the lateral and cuspid. The occlusion was corrected (Fig. 7), and following the exfoliation of the sequestrum, subgingival curettage was performed with very satisfactory results in bone repair and tightening of the affected teeth (Fig. 8). This case has been followed for two more years (Fig. 9).

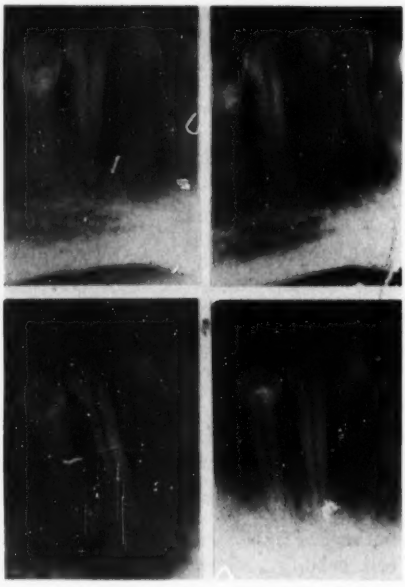


Fig. 8. Case #3. Upper left, radiograph of sequestrum, upper right after exfoliation, lower left, two months later, and lower right, two years later.

Fig. 7. Case #3. Lateral and cuspid reshaped.

Fig. 9. Case #3 two years after treatment.

Effects of Toothbrushing with Dentifrices Containing Chlorophyllin on Gingivitis

by C. H. McDONNELL, D.D.S.* *and* E. F. DOMALAKES, D.D.S.,* *Boys Town, Nebraska*

The primary purpose of this investigation was to determine the influence of toothbrushing with dentifrices containing water-soluble chlorophyllins upon the course of gingivitis. The effects of toothbrushing with an ordinary (nonchlorophyllin) dentifrice were also measured.

MATERIAL AND METHODS

The inhabitants of Boys Town were selected as subjects of this study because of their excellent living conditions and supervision. The dietary and physical conditions were constant for the entire group—an important factor since the exact influence of the physical and nutritional character of the diet on simple gingivitis is not well established. The boys lived in dormitories and cottages in groups of 15 to 25 under the supervision of a counselor. The cooperation was excellent, thanks to Monsignor Nicholas Wegner, Father Edmund Walsh and their staff of counselors.

The group represented a cross-section of American boys between the ages of 10 and 18 years. This study reports on the gingivitis experience of 589 out of the total of 738 boys living in Boys Town. The remainder (149) were short-term inhabitants and could not be followed over the entire period of this study.

The boys were divided into 3 groups, without selection, and according to ages only so that a comparable distribution would result (see bottom line in figure 1). One group was given an essentially neutral dentifrice containing water-soluble chlorophyllins, another group was given an alkaline dentifrice containing water-soluble chlorophyllins and the third group was given the control dentifrice, colored white and containing no "chlorophyll." At the time of each examination, the examiner did not know nor enquire as to the nature of the dentifrice used by each child.

Dentifrices Used. The control (non-chlorophyll) dentifrice (code number 49) contained insoluble sodium metaphosphate and dicalcium phosphate as the polishing agents homogeneously dispersed in an aqueous-glycerin base. Purified sodium lauryl sulfate was the detergent used. Gums and flavor were auxiliary ingredients. The reaction was approximately neutral (pH 6.5).

One of the two "chlorophyll" dentifrices (code number 39) was of the same composition as the control except that 0.1% of water-soluble sodium copper chlorophyllin was added.

The second "chlorophyll" dentifrice (code number 29) contained 0.1% of sodium copper chlorophyllin with calcium and magnesium carbonates as polishing agents homogenously dispersed in an aqueous sorbitol base. Sodium lauryl sulfate was the detergent used, with gum and flavor as auxiliary ingredients.

Toothbrushes Used. The toothbrushes used consisted of 50 tufts fitted with 0.008" or 0.009" nylon bristles, 7/16" long in a brush head 1 3/16" x 5/16". These were replaced whenever the boy requested it or when the brush showed signs of wear. Each brush was replaced approximately every 2 months. None was used longer than 4 months.

Method of Brushing. At the beginning of the study each boy was given a toothbrush and a tube of toothpaste bearing only a code number. The toothpaste was also replaced as often as necessary. After the initial examination and records had been completed, the examiner met with each group of 25 grade school and 15 to 20 high

school boys and explained the importance of regular and routine oral hygiene. A modified version of the Stillman-McCall method of brushing was demonstrated to each group, including the counselors, at the beginning of the study and at periodic intervals thereafter both individually during the examination of the mouth and in groups at approximately monthly intervals. However, the counselors reported that the majority of the younger children soon gave up this technique in favor of a simple scrubbing motion. This fact was confirmed by inspection of the old toothbrushes. The pattern of wear indicated that the majority of the boys used a scrubbing motion in cleaning their teeth.

The brushing was performed in groups in the large wash room attached to each dormitory under direct supervision of a counselor or junior counselor for 2 minutes (timed) twice per day, (a) immediately after breakfast and before the daily clean-up period and (b) before retiring, immediately before the evening shower. A check sheet was placed in each dormitory and each boy was checked off on a performance chart during his brushing. However, after the program had been in effect for 2 months, the brushing became so routine that very few (5 to 10%) omitted this daily procedure. In fact, the counselors reported that the younger children liked the routine and complained if it were broken due to loss of a toothbrush or dentifrice.

The toothbrushing was carefully and personally supervised by the counselors of the grade school boys. This supervision was less strict in the older boys. The daily charting in this group was done by the junior counselors, boys elected to this office.

Each boy was reminded of toothbrushing during each oral examination and when he had roentgenograms taken of his teeth. These reminders were made emphatically when the teeth appeared to be dirty and neglected. In addition to these reminders, the examiner visited each dormitory at monthly intervals to check the cooperation of each group.

Prophylaxis, topical fluoride treatments and the use of other dentifrices or treatments which might affect the results were not permitted during the course of this study.

Method of Analysis. The amount of gingivitis in each individual was assessed using the P-M-A method as suggested by Massler, Schour and Chopra.[1] A careful review of the literature revealed that this method (and a similar one suggested by King)[2] are the only ones presently available for the quantitative assessment of gingivitis in children.

The P-M-A Index. The interdental papilla and labial gingival margin surrounding each tooth as well as the attached portion of the labial gingivae were examined separately and recorded as being normal (0), slightly inflamed (1+), moderately inflamed (2+) or severely inflamed (3+). Necrotic gingivitis was not encountered in this group. The number of papillary, marginal and attached gingival units affected were then counted in each individual. For this calculation, the degree to which each unit was affected was disregarded. Each unit was counted only as being affected whether scored as 1+, 2+ or 3+. The average number of P-M-A units affected per person constitutes the P-M-A index for the group. For statistical convenience, the number of P + M + A units affected were added and designated as the PMA score (Massler and Savara).[3]

The anterior segments only, from cuspid to cuspid, were examined in this study because Massler, Schour and Chopra[1] indicated that these areas bear the bulk of the gingivitis experience in any given mouth and present a good index of the gingivitis experience of the entire mouth. The anterior segments also permit greater accuracy in this assessment since they are much more easily and clearly viewed than are the posterior teeth. Confining the examination to the anterior gingivae was valid since the purpose of the study was to compare the

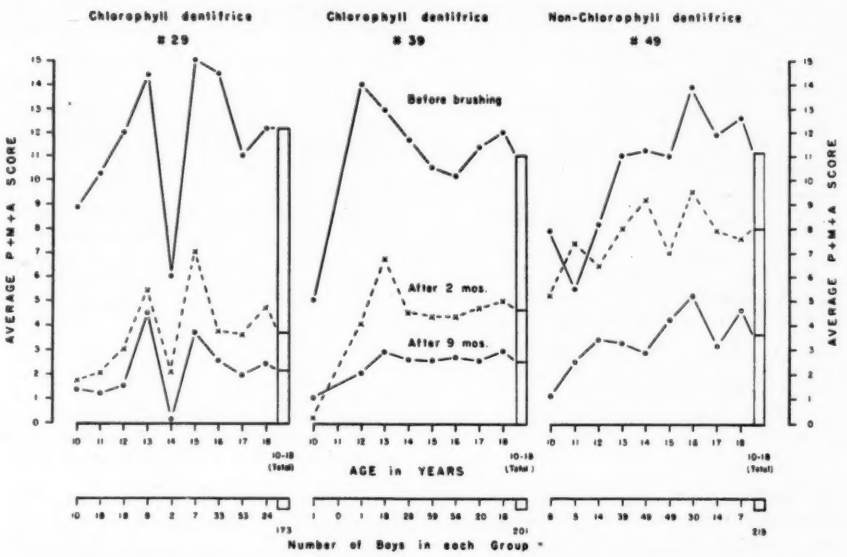


Fig. 1. Average PMA score at each age level in each of 3 groups before (top line) and after brushing for 2 (middle) and 9 month (bottom line) periods with 3 different dentifrices. The number of boys in each age group is indicated along the bottom line. The horizontal lines in the bar graph at the right indicate the PMA score for the entire group of 10 to 18 year old boys.

condition of the gingivae before and after the routine use of a toothbrush, rather than the total gingivitis experience in the entire group.

Since any average figure indicates only the central tendency for the group and does not adequately express the variety of lesions that can occur within the group, the distribution of the number of cases with no gingivitis, mild, moderate and severe gingivitis is equally important in the assessment of gingival disease—especially when changes within a group are to be evaluated. The distribution of various degrees of gingivitis was therefore included in this analysis (see figure 2).

Finally, since this study is in reality analagous to a study of the effects of a therapeutic procedure and a therapeutic agent upon a disease entity, it was felt that the analysis should include an evaluation of the effect of these therapeutic agents upon the individual and his tissues—i.e., whether the case improved, remained the same or became worse. In this manner the range of the effects of the therapeutic procedure could be more accurately depicted.

In order to keep the factor of estimation of the degree of gingivitis as constant as possible, all examinations were made by the same examiner (E.F.D.). This examiner was trained in the technique of examination and supervised at intervals in order to make certain that unconscious prejudice did not influence his judgment as the study progressed. The charting was done by a recorder while the examiner dictated his findings during the examination.

The first examination was conducted in June 1951, before the brushing program

TABLE 1

Effects of Toothbrushing on Gingivitis: Number of P-M-A gingival units affected before and after brushing for 2 and 9 months with 3 different dentifrices (in boys 10 to 18 years of age).

Group Using Dentifrice No.	*Number Examined*	*At Beginning of Study*	*After 2 Months*	*After 9 Months*
		P—M—A (PMA)	*P—M—A (PMA)*	*P—M—A (PMA)*
29 (Chlorophyllin)	173	7.2—4.4—0.5 (12.1) (% Reduction)	3.0—0.65—0 (3.65) (69.8%)	1.8—0.3—0 (2.1) (82.6%)
39 (Chlorophyllin)	201	6.1—4.3—0.6 (11.0) (% Reduction)	3.4—1.1—0.1 (4.6) (58.2%)	2.2—0.3—0 (2.5) (77.3%)
49 (No Chlorophyllin)	215	6.9—3.5—0.7 (11.1) (% Reduction)	6.0—1.9—0.1 (8.0) (27.9%)	2.9—0.7—0 (3.6) (67.6%)
	589	6.7—4.2—0.6 (11.5)		

(PMA)=P+M+A

was started. The second examination was completed in August 1951, 2 months after the brushing had been in progress. The final examination was completed in March 1952 after a period of 9 months of regular and supervised toothbrushing.

The data was entered on IBM punch cards and tabulated by machine. Mr. Patrick Okura, chief statistician of Boys Town, supervised the statistical analysis.

Drs. Maury Massler and Isaac Schour reviewed the procedures used in this study and assisted in the analysis and interpretation of the data.

FINDINGS

Prevalence of Gingivitis at the Beginning of this Study. The clinical impression at the beginning of this study was that, in general, this group of boys exhibited more gingivitis than was to be expected in a comparable group of school children. This impression was confirmed after the first examination. The average PMA score (11.5) for this group (Table 1) was much higher than that reported for the anterior gingivae in Chicago Suburban Children (3.02).[3,8] The score for the anterior gingivae alone was even higher than that reported for the entire month in Chicago and Philadelphia children[4] and in male naval inductees.[5] The reason for the initially high gingivitis score in this group is probably the fact that these boys came to Boys Town from broken homes and practiced toothbrushing less than does the average child.

Effects of Toothbrushing. Two months after the regular regimen of brushing twice daily was instituted, the amount and severity of the (anterior) gingivitis decreased considerably (Tables 1 and 2). The regular brushing regimen quickly removed the gross débris as well as the green and brown stains that were prevalent on the teeth before the study was initiated. After 9 months, the amount and severity of gingivitis in the 3 groups using different dentifrices was diminished further—well below the level reported for Chicago and Philadelphia children by Massler, Cohen and Schour.[4]

Effects of Toothbrushing with a Non-Chlorophyll Dentifrice. In the group using the non-chlorophyll dentifrice the gingivitis was decreased from an average of 11.1 PMA anterior gingival units affected to 8.0 units affected after 2 months of routine toothbrushing. This represents a reduction of 27.9% in the average number of ante-

TABLE 2

Effects of Toothbrushing on Gingivitis: Number and per cent of persons improved remained the same or became worse after 2 and 9 months of brushing with 3 different dentifrices (boys 10 to 18 years of age).

Group Using Dentifrice No.	*Number Examined*	*Number and (%) of Persons in Each Category*							
		After 2 Months				*After 9 Months*			
		Improved	*No Change**	*Became Worse*	*No Gingivitis***	*Improved*	*No Change**	*Became Worse*	*No Gingivitis***
29 (Chlorophyllin)	173 (%)	159 (91.9)	7 (4.0)	1 (0.6)	6 (3.5)	162 (93.7)	4 (2.3)	0 (0)	7 (4.0)
39 (Chlorophyllin)	201 (%)	158 (78.6)	25 (12.4)	4 (2.0)	14 (7.0)	173 (86.1)	12 (6.0)	1 (0.5)	15 (7.4)
49 (No Chlorophyllin)	215 (%)	113 (52.6)	57 (26.5)	30 (14.0)	15 (6.9)	172 (80.0)	14 (6.5)	10 (4.7)	19 (8.8)
	589								

*A change of less than 3 PMA units was not considered to be significant.

**No gingivitis before and after brushing.

rior gingival units affected (Table 1).

After brushing for 9 months there was a further reduction in the number of anterior papillary, marginal and attached units affected to an average PMA score of 3.6 for the group. This represents a decrease of 67.6% in the average number of PMA units affected.

Effects of Toothbrushing with Dentifrices Containing Water-Soluble Chlorophyllins. After brushing for 2 months, the average number of anterior PMA units affected dropped from 12.1 to 3.65 in the group using the "chlorophyll" dentifrice number 29 and from 11.0 to 4.6 in the group using the "chlorophyll" dentifrice number 39. These figures represent reductions of 69.8% and 58.2%, respectively, in the numbers of gingival units affected (Table 1). The difference between the PMA score of the two groups using the two types of "chlorophyll" dentifrices was not statistically significant ($t=0.5$). The difference between the PMA scores of the two groups using the "chlorophyll" dentifrices (3.65 and 4.6) and the group using the non-chlorophyll dentifrice (8.0) was very significant ($t=5.1$ and 4.2).*

After 9 months of toothbrushing the PMA indices for the three groups were much closer than at the end of the two-month period (Table 1). Although the groups using the dentifrices containing chlorophyllins still showed a slightly lower number of PMA units affected (2.1 and 2.5) than did the group using the non-chlorophyll dentifrice (3.6), this difference was not statistically significant ($t = 2.0$ and 1.9).

$$t = \frac{\bar{Y}_1 - \bar{Y}_2}{s} \sqrt{\frac{n_1 \times n_2}{n_1 + n_2}}$$

At 15 degrees of freedom the value of t must be above 2.95 for a significance level greater than 1% (Fisher, R. A. and Yates, F. Statistical tables for biological, agriculture and medical research. ed. 3, Edinburgh, Oliver and Boyd Ltd., 1949).

The difference in the PMA values among the 3 groups at the beginning of the study was not statistically significant: between groups 29 and 39 $t = 0.4$; between groups 39 and 49 $t = 0.4$; between groups 29 and 49 $t = 0.9$.

These data were also subjected to analysis of variance by means of Fisher's test. The results were very similar to those obtained by the t test.

No clinical or statistically significant differences could be observed between the gingivitis experience of the two groups using the two different chlorophyllin containing dentifrices ($t = 0.3$).

Thus the final reductions in gingivitis (after 9 months of brushing in the three groups were similar in amounts (82.6%, 77.3% and 67.6%) (Table 1). However, the effect was achieved much more quickly in the two groups using the chlorophyllin containing dentifrices. Almost as great a reduction in gingivitis was achieved in 2 months by the groups using the "chlorophyll" dentifrices (69.8% and 58.2%) as was achieved by the group using the non-chlorophyll dentifrice for 9 months (67.6%).

The effects of three dentifrices can best be illustrated by graphic analysis of the original data as presented in figure 1. The average PMA score is shown for each age level. Note that the PMA score is more markedly reduced (at each age level as well as for the group as a whole) after 2 months of brushing in the groups using the "chlorophyll" dentifrices number 29 and 39 than the group using the non-chlorophyll dentifrice number 49. Note also that the level of gingivitis is similar in the 3 groups after 9 month of toothbrushing.

Effects of Toothbrushing on the Number of Cases with Mild, Moderate and Severe Gingivitis—Since average values such as the P-M-A index or the PMA score express only the central tendencies of the group as a whole, it was also necessary to determine the influence of toothbrushing on the gingivae of individual members of the group. The frequency distribution in each group was therefore analyzed in terms of the number of cases with no gingivitis (PMA, 0), mild gingivitis (PMA, 1-5), low moderate gingivitis (PMA, 6-10), high moderate gingivitis (PMA, 11-15), severe gingivitis (PMA, 16-20) and very severe gingivitis (PMA, 21+).

Figure 2 shows that after 9 months of toothbrushing, there was a striking reduction (in the 3 groups) in the number of cases with moderate, severe and very severe gingivitis with a sharp increase in the number of persons with mild and no gingivitis.

Further analysis of figure 2 shows that the shift in the frequency distribution from the moderate and severe gingivitis to the mild and no gingivitis, was accomplished much more rapidly in the groups 29 and 39 using the "chlorophyll" dentifrices than in group 49 using the non-chlorophyll dentifrice. In fact, almost the entire "shift to the left" was accomplished within the first two-month period in groups 29 and 39 while group 49 required 9 months to achieve a similar degree of change. Again the differences between the groups using the two dentifrices containing chlorophyllins were negligible.

Number of Persons Who Improved, Showed no Significant Change or Became Worse—Another method of following the response of the individuals within the group to a given therapeutic procedure (rather than the group as a whole) is to determine the number of persons who improved or became worse. Such analysis often reveals details not elucidated by "average" figures.

Since observational data of this type are subject to slight variations, a change of less than three units in the P-M-A index was not considered as significant. Thus a change from 1-0-0 to 2-0-0 or from 10-8-0 to 8-8-0 (or vice versa) is within the range of observational error if the P or M values were 1+. Such cases were scored as showing "no significant change."

After 2 months of brushing, 91.9% in group 29 and 78.6% in group 39 were improved, while only 52.6% in group 49 improved significantly. After 9 months of brushing the difference between the groups using the "chlorophyll" and non-chlorophyll dentifrices had diminished; 93.6% in group 29, 86.1% in group 39 and 80% in group 49 had improved significantly.

Table 2 shows that after 2 months of

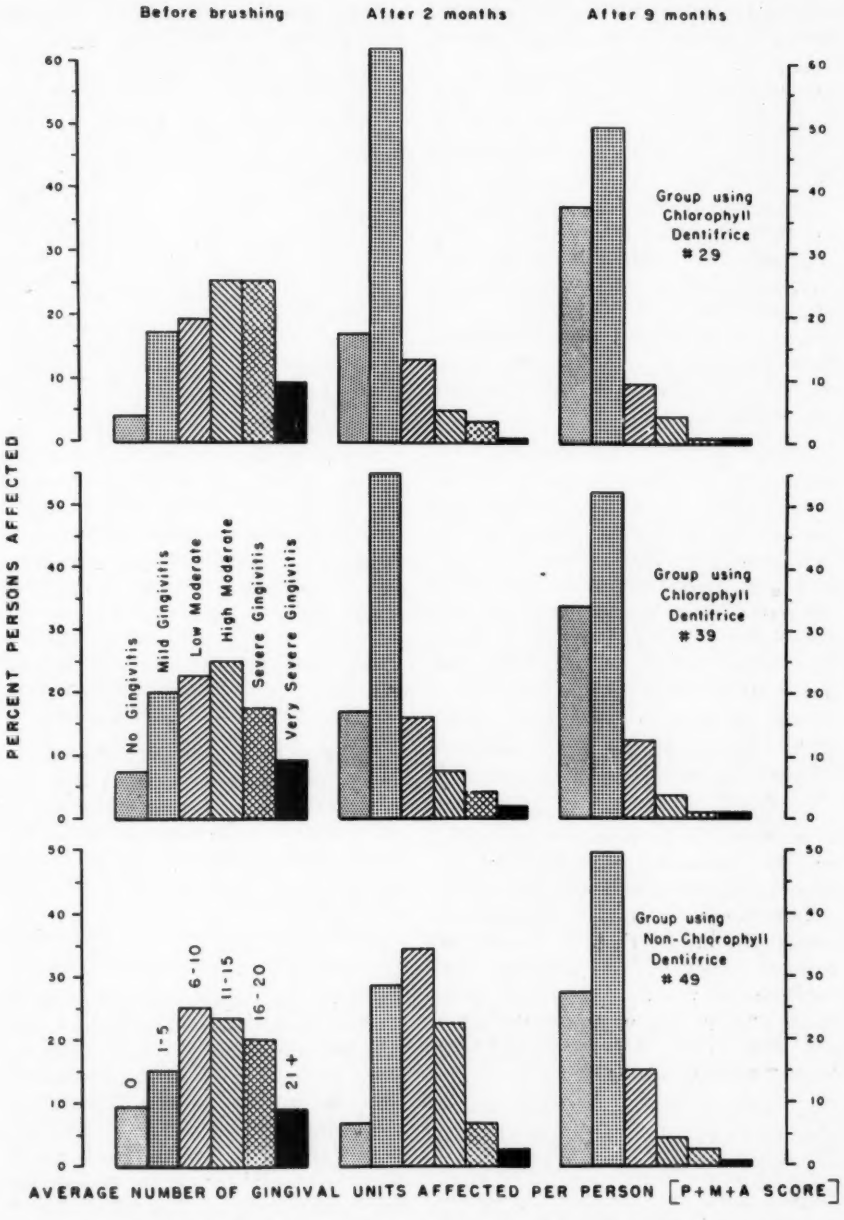


Fig. 2. Frequency distribution of the number of persons with different degrees of gingivitis before and after brushing for 2 and 9 months with 3 different dentifrices. The degree of gingivitis was assessed from the PMA score of each individual and grouped according to the legend in the graph.

toothbrushing only 1 person in group 29, 4 in group 39, but 30 boys in group 49 showed significantly more gingivitis than before the study was initiated. After 9 months of toothbrushing, none of the boys in group 29 and only 1 in group 39, while 10 in group 49 had more gingivitis than at the beginning of the study.

These data again emphasize the finding that individual improvement in gingivitis occurred earlier (within 2 months) and more completely in the two groups using the "chlorophyll" dentifrices than in the group using the non-chlorophyll dentifrice. After 9 months of regular toothbrushing, the effects of the three dentifrices were very similar.

Reasons for Non-Improvement in Individual Cases—Although the number was small (41 out of 589 boys or less than 7%) it was important to determine why 30 boys had not improved and 11 had become worse after 9 months of toothbrushing (Table 2). For this purpose a consultant was requested to re-examine these cases and the data, approximately one month after the last examination.

It was found that the majority of the 30 boys who showed no improvement had been lax in their toothbrushing habits.

In the majority of the 11 cases who became worse after 10 months of toothbrushing, the gingivae were severely edematous, hypertrophic or hyperplastic and serumal calculus could be readily demonstrated under the margins of the overgrown papillary gingivae. These boys had good toothbrushing records. The serumal calculus apparently acted as a primary irritant and conscientious toothbrushing aggravated the already engorged tissue.

It should be pointed out that none of these boys received a prophylaxis before or during this study.

DISCUSSION

Although the effect of toothbrushing in reducing the amount of gingivitis is well known and has been verified many times by every dental practitioner, we could not find any report demonstrating this fact in large groups. In fact, until the advent of the P-M-A method of assessment, it was not possible to score the amount of gingivitis before and after the toothbrushing and it was therefore very difficult to subject the results to statistical analysis. Estimations as to the general condition of the gingivae as a whole are too insensitive to permit satisfactory evaluation of any but very gross effects of toothbrushing on the gingivae. The P-M-A index permits the quantitative comparison of the amount of gingivitis in a given individual group before and after instituting a program of regular toothbrushing. The use of the P-M-A index is as necessary for an accurate evaluation of the effects of toothbrushing on the gingivae as is the use of the DMF index in the evaluation of effects of topical or systemic fluorides on caries experience. In both instances, gross estimations of the effects would be inadequate. An evaluation of the effects of therapeutic agents upon gingivitis experience is possible only when a quantitative method of evaluation such as the P-M-A index is used.

This study confirms in quantitative terms the oft repeated observation that regular toothbrushing reduces the amount of gingivitis in children. The data obtained in this study indicates also that when water-soluble chlorophyllins were added to a dentifrice, the reduction in gingivitis was accelerated significantly in the groups studied. The reason for this action is not yet known.

The dramatic improvement in gingivitis observed in this study is undoubtedly related to the initially high incidence of gingivitis in these children. It would be important to also determine the effects of toothbrushing with a dentifrice containing chlorophyllin in a low gingivitis group. Similarly, it will be important to determine the effects of toothbrushing and the effects of chlorophyllins in adults since the character of the gingivitis tends to change with age.[6]

SUMMARY AND CONCLUSIONS

The effects of brushing with 3 different dentifrices upon gingivitis were studied in a group of 589 boys ages 10 to 18 years living in Boys Town. This group showed an unusually high degree of gingivitis before this study was initiated. The amount of gingivitis (as measured by the average number of inflamed papillary, marginal and attached gingival units in the anterior segments of each person) was greatly reduced after 2 months of regular and routine brushing twice each day (after breakfast and before retiring). A further (but lesser) reduction in gingivitis was achieved after an additional 7 months of brushing (Table 1 and Fig. 1).

The reduction in gingivitis occurred more rapidly in the two groups using the dentifrices containing chlorophyllin than in the group using the non-chlorophyll dentifrice. At the end of 2 months of brushing, the reduction in gingivitis was 70% and 58% in the 2 former groups and only 28% in the latter (Table 1). At the end of 9 months the reduction in the gingivitis was similar in all 3 groups (82%, 77% and 68%).

At the end of 2 months of brushing, the PMA scores of the boys using the "chlorophyll" dentifrices were significantly lower than the PMA scores of those using the non-chlorophyll dentifrice. However, at the end of 9 months, these differences were reduced and were statistically not significant (Table 1 and Fig. 1).

It was therefore concluded that the reduction in gingivitis was significantly accelerated in the groups using the dentifrices containing chlorophyllin during a 2 month period but that continued use (over a 9 month period) resulted in no advantages over the non-chlorophyll dentifrice.

These findings were substantiated by the analysis of the frequency distribution in the number of persons with no gingivitis, mild, moderate and severe gingivitis before and after brushing. The number of boys with no gingivitis and mild gingivitis (PMA 1-5) increased while the number with high moderate (PMA 11-15) and severe gingivitis (PMA 16+) decreased more rapidly in the groups using the dentifrices containing chlorophyllin than in the group using the control non-chlorophyll dentifrice (see figure 2 for details). At the end of 2 months, the difference was marked. After 9 months, the difference was negligible.

The above findings were substantiated further by the analysis of the number of boys who improved or became worse (Table 2). At the end of 2 months, a greater percentage had improved in the groups using the dentifrices containing chlorophyllin (91.9% and 78.6%) than in the group using the non-chlorophyll dentifrice (52.6%). After 9 months of brushing, these differences were less prominent (93.7%, 86.1% and 80% improved). Very few (7%) failed to show improvement in gingivitis after 9 months of brushing.

No significant differences in the effects on gingivitis were observed between the two types of chlorophyllin dentifrices used in this study.

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*Study made in Boys Town Dental Clinic, Boys Town, Nebraska.

This study was supported by grants from the Pepsodent Division of Lever Brothers Company and Rystan Company, Inc.

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The Dietary Status of 234 Patients with Paradentosis

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AMPLE evidence of dietary and systemic factors in paradental disease has been presented in the dental literature. An excellent review of the literature has been summarized by J. D. King (1948). Hardly any approaches to an evaluation of these factors in etiology and therapeutics have been made in large groups of cases. A notable exception is the report by Becks (1941) on the systemic background of paradentosis in 80 patients of the dystrophic type. The present report analyses 16 nutritive factors in the dietary intake of 234 patients suffering from paradentosis.

DESCRIPTION OF CASES

In all cases, pocket formation was pronounced, teeth were loosened, and alveolar atrophy was evident in the roentgenograms. The destructive processes were active and progressing rapidly. No classification was attempted according to type of bone structure (sclerotic, normal, porotic, or dystrophic); presence or absence of pus, hemorrhage, ulceration, granulation tissue formation; or gingival condition (inflamed, hypertrophied, or atrophied). From the standpoint of classification, they are grouped in the combined type of paradentosis (Becks, 1941). This is the terminal stage of paradentosis in which destruction of the paradentium has involved the gingival and investing tissues as well as alveolar bone and pathologic pocket formation is well established.

Classification of the cases according to physical activity shows that all of the 234 partake in only light exercise and are only mildly active. In the categories set up by the National Research Council (1948), this corresponds to the nutritional needs of the sedentary group.

All cases were from private practices. Fifty-seven were males (Table 1) ranging in age from 22 to 61 years, and 177 were women whose ages ranged from 20 to 67 years. Most of the men were executive office workers or professional workers. The majority of the women were wives of the same type of individuals who comprised the male group, teachers, secretaries, or professional workers. The financial status of both male and female groups permitted the choice and purchase of practically any

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TABLE 1.

Mean, dispersion and range of physical measurements of 234 (57 male, 117 female) patients with paradentosis

	Mean		*Sigma*		*Range*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*
Age—yrs.	40.5	37.6	9.4	9.2	22–61	20–67
Height—in.	68.7	63.8	2.1	2.8	64–72	50–72
Weight—lbs.	161.5	127.4	20.4	17.1	122–217	90–205
Over—under weight—lbs.	−0.4	−5.8	11.1	10.8	−20+37	−30+35

kind of food desired.

The distributions according to age of males and females were practically the same; the average (mean, M) age of the males was 40.5 years with a standard deviation (sigma) of 9.4 years. This is less than one step interval above that of the females who averages 37.6 years with a sigma of 9.2 years.

The average height of the males was not unusual, M = 68.7 inches and sigma equals 2.1 inches with a range of 64 to 72 inches. The height of the females varied from 50 to 72 inches and averaged 63.8 inches with a sigma of 2.8 inches. A number of the females were rather tall as the distribution shows only 24.3% in the step interval containing the average, while in the next higher interval (64 to 65 inches) there are 31.6% of the females. There are a few very much shorter females.

In weight (Table 1.) the males averaged 161.5 lbs. (sigma = 20.4 lbs.) and ranged from 122 to 217 lbs. The females averaged 127.4 lbs. (sigma = 17.1 lbs.) with a range from 90 to 205 lbs. That the figures for the males are consistent with the normal height-weight tables is seen in the distribution of Table 2. where deviations from normal weight are given. In the case of Table 2. only the values in the left hand column, representing the step intervals indicate the mid-value of the step interval; hence, the interval marked zero in the left hand column includes 20 males and 46 females whose weight was within ± 2½ lbs. of normal weight, and likewise for the other intervals. For example, the first interval noted as — 30 lbs. includes 3 females who are between 32½ and 27½ lbs. underweight. On the average, the males are 0.4 lbs. underweight (sigma = 11.1 lbs.) varying from 20 lbs. underweight to 37 lbs. overweight. The females on the other hand are 5.8 lbs. underweight on the average (sigma = 10.8 lb. with extremes of 30 lbs. underweight and 35 lbs. overweight). The largest number (mode) of males or females in any one interval is found within the group of normal weight ± 2½ lbs. There is among the remainder however, a greater number of males who are underweight than are overweight (22 as against 15) while among the females the remainder shows over 4 times as many who are underweight as are overweight (107 as against 24).

DETERMINATION OF DIETARY STATUS

The patients of the cooperating dentists* recorded all food and drink consumed, for one week. The forms used and the technic of evaluation have been described (Walsh, 1947). Briefly, the patient recorded on a paper while at the table all food eaten including the amount at each meal and between meals. This record was transferred by the patient, at a convenient time, to a large printed form on which amounts were totalled for the week. The form includes

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TABLE 2.

Over-under weight distribution of 234 paradentosis patients

Over-under weight (lbs.)	*Males*	*Females*	*% Males*	*% Females*
−30	0	3	-	1.7
−25	0	7	-	4.0
−20	5	8	8.8	4.5
−15	2	27	3.5	15.2
−10	6	36	10.5	20.3
−5	9	26	15.8	14.7
0	20	46	35.1	26.0
+5	2	8	3.5	4.5
+10	6	6	10.5	3.4
+15	4	3	7.0	1.7
+20	1	4	1.8	2.3
+25	1	1	1.8	0.6
+30	0	1	0.0	0.6
+35	1	1	1.8	0.6
Total	57	177	100	100

detailed instructions and aids in estimating the amounts consumed. After checking the patient's recordings and totals the items and amounts are transferred to punch cards.** The age, height, weight, deviation from normal weight and analyses from food tables for 16 nutrients are punched. The results from the tabulating machines are expressed as the average per day with 16 summary values.

AVERAGE DAILY AMOUNTS CONSUMED OF SPECIFIC NUTRIENTS

Protein

The daily protein intake of the 57 males averaged 99.2 gm. (sigma = 22.8 gm.) with extremes of 57 and 180 gm. (Table 3). All but four of the males (Table 4.) had an average daily intake equal to or greater than the 70 gm. allowance recommended by the Food and Nutrition Board of the National Research Council (N.R.C.). The 177 females averaged 76.7 gms (sigma = 19.2 gm.) with a range of 31 to 174 gm. (Table 3.). A greater proportion of the females (30 of 177) were below the N.R.C. allowance of 60 gm. of protein (for females) than in the case of the males. The average of the males also exceeds the N.R.C. allowance by a greater amount (29.2 gm.) than that of the females (16.7 gm.).

Fat

The fat intake of the males averaged 86.4 gm. (sigma = 33.5 gm.) and ranged from 31 to 248 gm. (Table 3). The average daily fat allowance of the N.R.C. for males of this activity is approximately 108 gm. The majority of the males (Table 5) had a fat intake lower than 108 gm., some were as low as one-fifth this amount, while some reached double this figure. The female group had an average intake of 68.6 gm. (sigma = 22.3 gm.) with a range from 25 to 140 gm. (Table 3).

The N.R.C. allowance for females of this activity is approximately 90 gm. Among the females (Table 5) 90% eat this amount or less, some eat only one-third this amount, while some exceed it by more than 50%.

Carbohydrate

The average daily carbohydrate intake

**Of the International Business Machines Corporation, San Diego, California.

of the males was 216.1 gm. (sigma = 56.1 gm.) with a range from 28 to 326 gm. (Table 3). The distribution of Table 6 shows that all but a few of the males did not consume as much as the N.R.C. allowance of 312 gm. In fact, well over half of the males eat one-third less than this figure. The females averaged 177.7 gm. (sigma = 44.0 gm.) with a range from 66 to 374 gm. These figures also are low by a third in comparison to the N.R.C. recommended allowance of 262 gm.

Calories

The males consumed an average of 2152 calories (sigma = 491 calories), the lowest was 1230 and the highest was 4320 (Table 3).

Table 7 shows that about 84% were below the N.R.C. allowance of 2400 calories. Half of the males were a third or more below this allowance. The females averaged 1685 calories (sigma = 396 calories) with the lowest figure at 720 calories and the highest at 3160 calories (Table 3). While the males averaged 15% below the N.R.C. allowance the females were 20% low on the average. In Table 7 it is seen that 87% of the females were below the N.R.C. allowance.

TABLE 3.

Mean dispersion and range in food intake and physical measurements of 234 (57 male, 177 female) patients suffering from periodontal disease

		Mean		*Sigma*		*Range*	
		Male	*Female*	*Male*	*Female*	*Male*	*Female*
Protein	gm.	99.2	76.7	22.8	19.2	57—180	31—174
Fat	gm.	86.4	68.6	33.5	22.3	31—248	25—140
Carbohydrate	gm.	216.1	177.7	56.1	44.0	28—326	66—374
Calories		2152	1685	491	396	1230—4320	720—3160
Calcium	gm.	0.81	0.72	0.40	0.36	0.25—2.48	0.16—2.14
Phosphorus	gm.	1.40	1.13	0.39	0.35	0.70—2.95	0.43—2.40
Iron	mg.	13.5	10.7	3.4	2.8	6.6—24.8	5.1—18.2
Iodine	ug.	50.9	40.2	20.6	14.1	21—106	15—114
Acid		39.0	28.0	9.2	7.2	23—76	10—63
Base		31.3	32.0	12.6	12.0	2—81	12—80
Vitamin A.	USP units	7,290	6,490	2,950	2,580	1,500—19,700	1,600—15,300
Thiamine	mg.	0.84	0.72	0.23	0.20	0.29—1.51	0.30—1.30
Riboflavin	mg.	1.74	1.45	0.60	0.54	0.14—3.05	0.43—3.19
Niacin	mg.	24.4	17.7	8.9	6.0	10—68	5—51
Ascorbic acid	mg.	64.0	71.4	29.6	33.7	3—137	8—205
Vitamin D	USP units	51.0	37.9	27.2	25.4	3—134	4—180
Calgrans*		764	552	171	200	30—144	15—141
% Calgrans		36.1	33.0	8.8	9.5	18—63	2—62
Carbgrans**	gm.	153.3	96.5	43.1	39.0	41—315	7—230
% Carbgrans		60.9	54.2	11.6	12.6	37—98	3—84
Anprot***	gm.	70.1	53.8	23.0	17.5	28—150	12—143
% Anprot		69.8	68.7	9.8	9.6	40—90	21—88
Age	yrs.	40.5	37.6	9.4	9.2	22—61	20—67
Height	in.	68.7	63.8	2.1	2.8	64—72	50—72
Weight	lbs.	161.5	127.4	20.4	17.1	122—217	90—205
Over-underweight	lbs.	−0.4	−5.8	11.1	10.8	−20 +37	−30 +35

*Calories derived from grains and refined sugars.
**Carbohydrates derived from grains and refined sugars.
***Protein derived from animal sources

Calcium

The daily calcium intake of the 57 males averaged 0.81 gm. (sigma = 0.40 gm.) and ranged from 0.25 to 2.48 gm. (Table 3). The distribution of Table 8 shows that about 50% of the males consumed about one-half or less calcium than the N.R.C. allowance. Among the 177 females the average calcium intake was 0.72 gm. (sigma = 0.36 gm.) and ranged from 0.16 to 2.14 gm. The distribution of Table 8 shows that the females were also low in calcium intake and in fact slightly lower than the males.

Phosphorus

The phosphorus intake of the males averaged 1.40 gm. (sigma = 0.39 gm.) and ranged from 0.70 to 2.95 gm. (Table 3). The distribution of Table 9 shows that the N.R.C. allowance of 1.5 gm. was exceeded by more than half of the group while a few were as low as one-half the allowance. The females showed a slightly lower intake with an average of 1.13 gm. (sigma = 0.35 gm.) and a range from 0.43 to 2.40 gm. (Table 3). The distribution (Table 9) shows a large number of females with less than the recommended allowance; the lowest being only 28% of this figure.

Iron

The average iron intake of the males was 13.5 mg. (sigma = 3.4 mg.) with a range of 6.6 to 24.8 mg. (Table 3). The distribution shown in Table 10 indicates that although the average intake of males is close to the allowance of the N.R.C. several were quite low. The lowest was only half the recommended amount; a few were as high as double this amount. The females average 10.7 mg. (sigma = 2.8 mg.) with a range of 5.1 to 18.2 mg. (Table 3). This is somewhat lower than the recommended intake of 12 mg. In Table 10, it is seen that a large number of this group were low and at least 5% had only half the recommended amount. A few females consumed as much as 50% over the N.R.C. allowance.

TABLE 4.

Daily protein intake of 234 paradentosis patients

Protein (grams)	*Males*	*Females*	*Cumulative % Males*	*Cumulative % Females*
20–39	0	2	–	1.1
40–59	1	28	1.8	16.9
60–79	6*	77**	12.3	60.4
80–99	27	48	59.7	87.5**
100–119	17	20	89.5	98.8
120–139	3	1	94.8	99.4
140–159	1	0	96.5	99.4
160–179	1	1	98.3	100
180–199	1	0	100	——
Total	57	177	——	——

*National Research Council, 1948, recommended dietary allowance is 70 grams for males and 60 grams for females.

**Means 87.5% of females consumed less than 100 grams of protein.

Iodine

The daily iodine intake of the 57 males averaged 50.9 ug. (sigma = 20.6 ug.); the lowest intake observed was 21 ug. and the highest was 106 ug. (Table 3). At least 50% of the males had an intake from food of less than 50 ug. The females had an average intake of 40.2 ug. (sigma = 14.1 ug.) with a range from 15 to 114 ug. (Table 3).

Acid Ash

The males consumed a diet with an average acid ash value of 39.0 units (1 unit is equivalent to 1 c.c. $\frac{N}{10}$ alkali) (sigma = 9.2 units): the range was from 23 to 76 units (Table 3). The females average 28.0 units (sigma = 7.2 units) with a range from 10 to 63 units (Table 3).

Base Ash

The males averaged 31.3 units (1 c.c. is equivalent to 1 c.c. $\frac{N}{10}$ acid) sigma = 12.6 units and ranged from 2 to 81 units (Table

TABLE 5.

Daily fat intake of 234 paradentosis patients

Fat (gm.)	*Males*	*Females*	*Cumulative % Males*	*Cumulative % Females*
20–39	1	17	1.8	9.6
40–59	8	49	15.8	37.3
60–79	20	60	50.9	71.2
80–99	13	34	73.7	90.4
100–119	9	12	89.5	97.2
120–139	3	4	94.8	99.5
140–159	1	1	96.5	100
160–179	1	0	98.3	—
240–259*	1	—	100	—
Total	57	177	—	—

*Intervals with zero frequencies have been omitted.

3). The females averaged 32.0 units (sigma = 12.0 units) with a range from 12 to 80 units (Table 3).

Vitamin A

The average intake for males was 7,290 units of Vitamin A (sigma = 2,950 units) with extremes of 1,500 and 19,700 (Table 3). The females averaged 6,490 units (sigma = 2,580 units) with extreme of 1,600 to 15,300 units (Table 3). The distribution (Table 11) shows very few of either sex to be below the intake recommended by the National Research Council.

TABLE 6.

Daily carbohydrate intake of 234 paradentosis patients

Carbohydrate (grams)	*Male*	*Females*	*Cumulative % Males*	*Cumulative % Females*
0–29	1	0	1.8	—
30–59	0	0	1.8	—
60–89	0	1	1.8	0.6
90–119	2	12	5.3	7.4
120–149	3	37	10.6	28.3
150–179	7	47	22.9	54.9
180–209	11	40	42.2	77.5
210–239	15	30	68.5	94.4
240–269	10	6	86.0	97.8
270–299	3	1	91.3	98.4
300–329	5	2	100	99.5
330–359	0	0	—	99.5
360–389	0	1	—	100
Total	57	177	—	—

Thiamine

The average intake of the males, 0.84 mg. (sigma = 0.23 mg.) is *far below the recommended allowance.* The observed intake ranges from 0.29 to 1.51 mg. (Table 3). The females are also very low with an average of 0.72 mg. (sigma = 0.20 mg.) and a range from 0.30 to 1.30 mg. *The distribution of Table 12 shows that all but 5% of the males and all but 2% of the females are below the recommended allowance.*

TABLE 7.

Daily calorie intake of 234 paradentosis patients

Calories	*Males*	*Females*	*Cumulative % Males*	*Cumulative % Females*
600–890	0	2	—	1.1
900–1190	0	12	—	7.9
1200–1490	3	48	5.3	35.0
1500–1790	10	47	22.9	61.6
1800–2090	17	46*	52.7	87.6
2100–2390	15	13	79.0	94.9
2400–2690	9*	7	94.8	98.8
2700–2990	0	1	94.8	99.4
3000–3290	1	1	96.6	100
3300–3590	1	0	98.5	—
4200–4490**	1	0	100	—
Total	57	177	—	—

*National Research Council recommended allowance, 1948, is 2400 calories for males and 2000 calories for females.

**Intervals with zero frequencies have been omitted.

Riboflavin

The males averaged 1.74 mg. (sigma = 0.60 mg.) with a range of 0.14 to 3.05 mg. (Table 3). The females were lower with an average of 1.45 mg. (sigma = 0.54 mg.) and a range of 0.43 to 3.19 mg. The

TABLE 8.

Daily calcium intake of 234 paradentosis patients

Calcium (grams)	*Males*	*Females*	*Cumulative % Males*	*Cumulative % Females*
0.00–0.24	0	4	—	2.3
0.25–0.49	10	53	17.5	32.3
0.50–0.74	18	51	49.1	61.1
0.75–0.99	14	35	73.6	80.9
1.00–1.24	9*	17*	89.4	90.5
1.25–1.49	3	10	94.7	96.1
1.50–1.74	1	4	96.5	98.4
1.75–1.99	1	2	98.2	99.5
2.00–2.24	0	1	98.2	100
2.25–2.49	1	0	100	—
Total	57	177	—	—

*National Research Council recommended allowance, 1948, is 1.0 grams for both males and females.

distributions (Table 13) show a large percentage of females with very low riboflavin intakes.

Niacin

The average intake for males, 24.4 mg. (sigma = 8.9 mg.), is about double the recommended allowance, the values range from 10 to 68 mg. (Table 3). The females also have a high intake averaging 17.7 mg. (sigma = 6.0 mg.) and ranging from 5 to 51 mg. The distributions of Table 14 show that the niacin intake is rarely low, according to N.R.C. standards.

TABLE 9.

Daily phosphorus intake of 234 paradentosis patients

Phosphorus (grams)	*Males*	*Females*	*Cumulative % Males*	*Cumulative % Females*
0.25–0.49	0	1	—	0.6
0.50–0.74	1	18	1.8	10.8
0.75–0.99	4	58	8.8	43.5
1.00–1.24	21	42	45.6	67.2
1.25–1.49	12	32	66.7	85.2
1.50–1.74	14	14	91.3	93.1
1.75–1.99	2	10	94.8	98.7
2.00–2.24	1	1	96.5	99.3
2.25–2.49	0	1	96.5	100
2.50–2.74	1	0	97.3	—
2.75–2.99	1	0	100	—
Total	57	177	—	—

*National Research Council Standard, 1948, is 1.5 grams for both males and females.

Ascorbic Acid

The males show a reduced intake with an average of 64.0 mg. (sigma = 29.6 mg.) and a range from 3 to 137 mg. (Table 3). The females show a slightly higher average of 71.4 mg. (sigma = 33.7 mg.) with a range from 8 to 205 mg. More than 50% of the males (Table 15) and more than 40% of the females had less than the N.R.C. recommended allowance.

Vitamin D

The low vitamin D intakes common in the unsupplemented diets of adults are seen in Table 3. The males averaged 51.0 units (sigma = 27.2 units) and range from 3 to 134 units. The females average 37.9 units (sigma = 25.4 units) with a range from 4 to 180 units.

EVALUATION OF NUTRITIONAL IMBALANCE

The raw data presented in Tables 1 to 15 has been derived from cases completely worked up. Partial incompleteness of information has made it impossible to present data on the total number of other patients suffering from paradentosis whose diets have been analyzed. After following the results of treatment in several thousand cases of paradentosis, several criteria of dietary inadequacy and imbalance have been found of value in establishing the prognosis and plan of treatment.

Proportional Intake of Grains and Refined Sugars

Calories Derived from Grains and Refined Sugars (Calgrans)—The number of calories derived from these concentrated carbohydrate sources (Walsh, 1948) is one of the most important criteria of dietary

imbalance in patients suffering from paradentosis. The average is 764 for males (sigma = 171 calories) with extremes of 30 and 1440 calories (Table 3). The females average 552 calories (sigma = 200 calories) and ranged from 15 to 1410 calories. In the distributions of Table 16, the females show a much greater proportion of cases in the lower amounts than do the males, doubtless a reflection of the calorie consciousness of the average female.

Proportion of Calories Derived from Grains and Refined Sugars—When the number of calories derived from grains and refined sugars is expressed in proportion to the total caloric intake the significance of a possible imbalance becomes evident. The males show an average of 36.1% (sigma = 8.8%) with low and high values of 18 and 63% (Table 3). The females averaged 33.0% (sigma = 9.5%) and range from 2 to 63%. In other words, one-third of the total caloric intake was derived from sources other than protein foods, vegetables, fruits and straight fats. The distribution of Table 17 show that most of these individuals derive large proportions of their food from sources primarily providing only calories.

Grams of Carbohydrate Derived from Grains and Refined Sugars—When these sources are expressed as grams of carbohydrate, they are in a form readily translated into dietary prescription and easily compared with an optimum proportion in diet.

The males averaged 153.3 grams from these sources (sigma = 43.1 gm.) with a range from 41 to 315 gm. (Table 3). The females were much lower in amount with an average 96.5 gm. (sigma = 39.0 gm.) and a range of 7 to 230 gm. The distribution of Table 18 show that the females are grouped at a slightly lower level than the males.

Proportion of Carbohydrate Intake Derived from Grains and Refined Sugars—From these figures it is seen that on the average the males derived 60.9% (sigma = 11.6%) and females, 54.2% (sigma = 12.6%) of their carbohydrates from these relatively poor sources of minerals and vitamins (Table 3). The extremes observed for males were 37 and 98% and for females, 3 and 84%. The distributions of Table 19 show that in spite of their reputed calorie consciousness the females matched

TABLE 10.

Daily iron intake of 234 paradentosis patients

Iron (mg.)	*Males*	*Females*	*Cumulative % Males*	*Cumulative % Females*
5.0–6.9	1	10	1.8	5.7
7.0–8.9	0	17	1.8	15.3
9.0–10.9	4	52	8.8	44.7
11.0–12.9	16*	39*	36.9	66.7
13.0–14.9	17	33	66.7	85.3
15.0–16.9	11	21	86.0	97.2
17.0–18.9	5	5	94.8	100
19.0–20.9	1	0	96.6	—
21.0–22.9	0	0	96.6	—
23.0–24.9	2	0	100	—
Total	57	177	—	—

*National Research Council Standard, 1948, is 12 milligrams for both males and females.

TABLE 11.

Daily vitamin A intake of 234 paradentosis patients

Vitamin A (USP units)	*Males*	*Females*	*Cumulative % Males*	*Cumulative % Females*
0–1,990	1	1	1.8	0.6
2,000–3,990	3	26	7.1	15.3
4,000–5,990	18*	56*	38.7	46.9
6,000–7,990	14	53	63.2	76.9
8,000–9,990	12	22	84.2	89.3
10,000–11,990	6	14	94.7	97.2
12,000–13,990	2	2	98.2	98.3
18,000–19,990**	1	3	100	100

*National Research Council recommended allowance, 1948, is 5,000 USP units for both males and females.

**Intervals with zero frequencies have been omitted.

TABLE 12.

Daily thiamine intake of 234 paradentosis patients

Thiamine (mg.)	*Males*	*Females*	*Cumulative % Males*	*Cumulative % Females*
0.20–0.29	1	0	1.8	—
0.30–0.39	0	4	1.8	2.3
0.40–0.49	1	17	3.6	11.9
0.50–0.59	4	34	10.6	31.1
0.60–0.69	9	31	26.4	48.6
0.70–0.79	12	31	47.4	66.1
0.80–0.89	11	25	66.7	80.2
0.90–0.99	8	16	80.8	89.2
1.00–1.09	3	11*	86.1	95.4
1.10–1.19	5	6	94.9	98.8
1.20–1.29	0*	1	94.9	99.4
1.30–1.39	0	1	94.9	100
1.40–1.49	2	0	98.4	—
1.50–1.59	1	0	100	—
Total	57	177	—	—

*National Research Council recommended allowance, 1948, is 1.2 milligrams for sedentary males and 1.0 milligrams for sedentary females.

the proportion of carbohydrates derived from "fattening" foods which the males consumed although the latter ate a much greater amount (Tables 3 and 18).

Protein Derived from Animal Sources—Animal proteins (derived from milk, cheese, eggs, meats, seafoods) have greater biological value than vegetable proteins in the sense that they furnish the essential amino acids in relatively greater amounts. The amount of animal protein consumed by the males averaged 70.1 gm. (sigma = 23.0 gm.) whereas the females averaged 53.8 gm. (sigma = 17.5 gm.) the respective ranges were 28 to 150 gm. and 12 to 43 gm. (Table 3). The distribution of Table 20 shows that the females are spread similarly to, but about one step interval (15 gm.) below the males.

Proportion of Protein Derived from Animal Sources—The sex groups are virtually identical in the percentage of protein derived from animal sources. The average for males is 69.8% (sigma = 9.8%) and for females is 68.7% (sigma = 9.6%). The respective ranges are 40 to 90% and 21 to 88% (Table 3).

COMMENT

An overall look at the situation of the patient with paradentosis is revealed in Table 21 and figure 1 which show the percentage distribution of all patients with respect to the recommended allowances for ten nutrients.

DISCUSSION

The outstanding deficiencies are those commonly noted in dietary analyses of large population groups: Calcium, thiamine and ascorbic acid. In addition, the females of the group were deficient in caloric intake, and a third were deficient in phosphorus, iron and riboflavin.

An unfavorable proportion between the intakes of certain nutrients is often suspected of being a factor in producing paradentosis. This may not be as marked in paradentosis as it is for instance in the case of calcium and phosphorus in growing children with an adequate intake of Vitamin

TABLE 13.

Daily riboflavin intake of 234 paradentosis patients

Riboflavin (mg.)	*Males*	*Females*	*Cumulative % Males*	*Cumulative % Females*
0.0–0.2	1	0	1.8	—
0.3–0.5	1	3	1.8	1.7
0.6–0.8	1	16	5.4	10.7
0.9–1.1	5	49	14.2	38.4
1.2–1.4	12	37	35.2	59.3
1.5–1.7	10	30*	52.7	76.3
1.8–2.0	13*	17	75.5	85.9
2.1–2.3	4	16	82.5	94.9
2.4–2.6	7	5	94.8	97.7
2.7–2.9	2	2	98.3	98.8
3.0–3.2	1	2	100	100
Total	57	177	—	—

*National Research Council recommended allowance, 1948, is 1.8 milligrams for males, and 1.5 milligrams for females.

D. Since the cause of paradentosis, however, is frequently not discernible an imbalance in the proportional intakes of calcium and phosphorus bears watching. The distribution of calcium to phosphorus ratios in the 234 patients studied is given in Table 30. The average ratio for males was 1 to 1.9 with extremes of 1 to 1.0 to 6.3. The ratio for females averaged 1 to 1.8 with extremes of 1 to 1.0 and 1 to 4.3.

In other words 75% of these patients, already suffering from disease of the alveolar bone, have selected an imbalance of foods such as to require special adjustment by compensating mechanisms within the body of the principal mineral factors in bone.

Another set of factors often suspected is the balance between the acid-ash and base-ash of the diet. The males have an average ratio of 1 to 0.7 with extreme ratios of 1 to 0.1 and 1 to 2.7. The females have an average ratio of 1 to 1.1 with extremes of 1 to 0.1 and 1 to 5.4. From these figures it is seen that a little more than 70% of the males and 35% of the females have unfavorable excesses of acid ash intake over base.

TABLE 14.

Daily niacin intake of 234 paradentosis patients

Niacin (mg.)	*Males*	*Females*	*Cumulative % Males*	*Cumulative % Females*
5–9	0	5	—	2.8
10–14	7*	53*	12.3	32.8
15–19	7	58	24.6	65.6
20–24	23	43	65.0	89.9
25–29	9	12	80.8	96.7
30–34	5	3	89.6	98.4
35–39	3	2	94.9	99.5
40–44	1	0	96.7	99.5
50–54	0	1	96.7	100
60–64**	1	0	98.3	—
63–69	1	0	100	—
Total	57	177	—	—

*National Research Council recommended allowance, 1948, is 12 milligrams for sedentary males and 10 miligrams for sedentary females.

**Intervals with zero frequencies have been omitted.

TABLE 15.

Daily ascorbic acid intake of 234 paradentosis patientse

Ascorbic Acid (mg.)	*Males*	*Females*	*Cumulative % Males*	*Cumulative % Femals*
0–19	1	4	1.8	2.3
20–39	12	33	22.8	20.9
40–59	17	34	52.6	40.1
60–79	11*	33*	71.9	58.7
80–99	7	36	84.2	79.0
100–119	7	26	96.5	93.7
120–139	2	4	100	96.0
140–159	0	4	—	98.3
160–179	0	2	—	99.4
220–239**	0	1	—	100
Total	57	177		

*National Research Council recommended allowance, 1948, is 75 milligrams for males and 70 milligrams for females.

**Intervals with zero frequencies have been omitted.

The unfavorable excesses of phosphorus relative to calcium and of acid ash over base are indications of the limited consumption by these patients of milk (and/or milk serum derivatives, such as cheese), fruits and vegetables. Although these individuals are 'calorie conscious' as evidenced by their low calorie intake, they have not included in their diets appropriate or desirable amounts of such protective foods as milk, fruits and vegetables.

As anticipated from the analysis of the unfavorable ratios of calcium to phosphorus and acid to base, the calories derived from the concentrated sources of grains and refined sugars were very high in proportion to the total calories.

This percentage is many times above the desirable figure of 15%, or less for nearly all of the patients. The figure of 15% is one which results from the major intake of calories from carbohydrates being obtained from "protective" foods such as milk, vegetables and fruits. This unfavorable situation is seen in the percentage of carbohydrates

derived from grains and refined sugars in relation to the total carbohydrate intake. When the major carbohydrate intake is from protective foods the percentage permissible from grains and refined sugars is usually less than 15%, especially in low caloric intakes where the total carbohydrate intake is 150 gm. or more. This figure also is exceeded by virtually every patient in this group.

Another index of nutritional imbalance of especial importance to persons with degenerative disease is the proportion of protein derived from animal sources, that is, the complete proteins. This figure will be above 60% when the protein intake is adequate or increased as is desirable for patients suffering from destructive disease.

Of great significance as a characteristic finding in patients with paradentosis is the relatively low caloric intake with maintenance of normal weight. The males are maintaining normal weight with a caloric intake 15% below that allowed for sedentary activity (Table 7). The females average 5.8% underweight on 20% less calories than are allowed for sedentary activity. This disproportion suggests an accompanying endocrine imbalance and warrants investigation by physical examination in the individual case. It is of great significance in this regard that Becks (1941) reports that 84% of patients suffering from the dystrophic type of paradentosis present endocrinopathies, especially hypothyroidism.

Niacin is one of the few B vitamins in which the intake of these patients appears adequate. One is tempted to suggest that although the niacin intake was adequate among these 234 individuals it was still possible to produce severe destruction of paradental tissues in this chronic disease in the presence of other dietary deficiencies. On the other hand, the oral symptoms found in a niacin deficiency such as pellagra are of an acute type. In support of these possibilities one calls to mind the published reports of successful response to niacin therapy of some cases of oral Vincent's infection, a severely acute disease (Sinclair, 1939). This possibility is further supported by our knowledge of the type of oral symptoms produced experimentally in pantothentic acid deficiency (Becks, Wainwright and Morgan, 1943; Wain-

TABLE 16.

Daily calories derived from refined grains and sugars intake of 234 paradentosis patients

*Calgrans**	*Males*	*Females*	*Cumulative % Males*	*Cumulative % Females*
0–190	0	3	—	1.7
200–390	3	33	5.3	19.2
400–590	7	77	17.6	62.7
600–790	22	50	55.2	90.9
800–990	19	11	88.5	97.1
1000–1190	5	2	97.3	98.3
1200–1390	0	2	97.3	99.4
1400–1590	1	1	100	100
Total	57	177	—	—

*Calories derived from grains and refined sugars.

TABLE 17.

Daily calories % derived from grains and refined sugars intake of 234 paradentosis patients

% Calgrans	*Males*	*Females*	*Cumulative % Males*	*Cumulative % Females*
0–4	0	1	—	0.6
5–9	0	0	—	0.6
10–14	0	4	—	2.9
15–19	1	7	1.8	6.9
20–24	3	26	7.1	21.6
25–29	8	25	21.1	35.7
30–34	16	31	49.2	53.2
35–39	10	38	66.7	74.7
40–44	7	30	79.0	91.6
45–49	8	9	93.0	96.7
50–54	3	2	98.3	97.8
55–59	0	3	98.3	99.5
60–64	1	1	100	100
Total	57	177	—	—

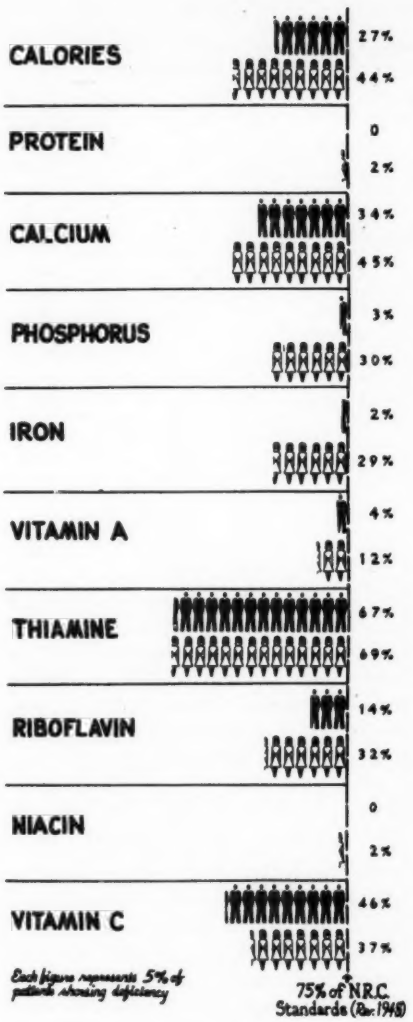

Fig. 1. Proportions of 234 (57 male, 177 female) patients suffering from paradentosis who consume less than 75% of the National Research Council allowance for 10 nutrients.

wright and Nelson, 1945). The latter deficiency produces extremely destructive changes in the oral mucosa with a characteristic progressive necrosis of epithelium and underlying connective tissue with no inflammatory response. In other words, in spite of an adequate intake of niacin in experimental animals a destructive chronic disease of the gingival tissues can be produced.

In human beings it is yet to be shown that a deficient diet will cause paradentosis. The present status may be stated only if the fact is kept in mind that there is rarely a single etiologic factor involved in human cases of paradentosis. Experience with experimental production of paradentopathies in animals has shown that there are a great variety of factors which singly can tip the balance from healthy maintenance of normal structures to destruction of tissues and malfunction of organs (Becks and Morgan, 1942; Wainwright, 1947; Mitchell, 1948; Becks, Wainwright, and Morgan, 1943).

The necessity for dietary analysis and diet prescription in cases of paradentosis lies not in discovering and overcoming a specific deficiency, but in changing the dietary environment in this disease from an unfavorable to a favorable one.

Patients with paradentosis are not "persons in Health" as assumed when the widely employed recommended allowances for nutrients are applied as criteria for adequacy of dietary intake. These patients are either suffering from a special predisposition to paradentosis and which predisposition will not be removed by incomplete therapy, even if recovery occurs, but which must be combated continuously in order to keep a favorable balance between maintenance or repair and destructive forces. Otherwise the factors in this predisposition may precipitate a relapse from such specific factors or imbalances as diet, ill-health, malocclusion, filth, etc. In our present state of inadequate knowledge of etiologic factors in paradentosis all factors —be they emotional, nutritional, medical, or dental—must be made favorable for healing.

Scully (1948) comments similarly after analyzing the diets of 100 patients with

TABLE 18.

Daily carbohydrates derived from grains and refined sugars intake of 234 paradentosis patients

Carbgrans (gm.)	*Males*	*Females*	*Cumulative % Males*	*Cumulative % Females*
0–29	0	3	—	1.7
30–59	1	18	1.8	11.9
60–89	6	61	12.3	46.4
90–119	12	52	33.4	75.8
120–139	19	36	66.8	96.1
150–179	11	3	86.1	97.8
180–209	7	2	98.4	98.9
210–239	0	2	98.4	100
300–329**	1	0	100	—
Total	57	177	—	—

**Intervals with zero frequencies have been omitted.

TABLE 20.

Daily protein derived from animal sources intake of 234 paradentosis patients

Anprot (gm.)	*Males*	*Females*	*Cumulative % Males*	*Cumulative % Females*
0–14	0	1	—	0.6
15–29	1	3	1.8	2.3
30–44	3	53	7.1	32.3
45–59	12	56	28.2	63.9
60–74	23	45	68.6	89.3
75–89	9	13	84.4	96.7
90–104	6	5	94.9	99.5
105–119	1	0	96.6	99.5
120–134	0	0	96.6	99.5
135–149	1	1	98.4	100
150–164	1	0	100	—
TOTAL	57	177	—	—

arthritis. He found deficiencies in one or more of the vitamins in 42% of the cases. None of these deficiencies were thought to be of etiologic importance but the patients improved mainly, he believes, because of improved general health resulting from dietary correction.

It is of extreme significance that these 234 patients with paradentosis show such a high incidence of dietary inadequacy and imbalance of nutrients. That the levels of intake observed in these patients suffering from paradentosis are not different from the poorest self-selected diets disclosed in large population surveys in this country is a revealing commentary on the choice of foods by these patients (economically speaking) able to buy "expensive" foods.

TABLE 19.

Daily % carbohydrates derived from grains and refined sugars intake of 234 paradentosis patients

% Carbgrans	*Males*	*Females*	*Cumulative % Males*	*Cumulative % Females*
0–9	0	1	—	0.6
10–19	0	0	—	0.6
20–29	0	4	—	2.9
30–39	3	21	5.3	14.8
40–49	6	31	15.8	32.3
50–59	14	54	40.4	62.8
60–69	24	47	82.6	89.4
70–79	8	18	96.6	99.6
80–89	1	1	98.4	100
90–99	1	0	100	—
Total	57	177	—	—

The many individual instances of extremely imbalanced and inadequate diets in this survey which contributed as major factors in the production of destructive disease of the mouth are obscured in the statistical figures presented in the tables. The total picture of healing may be affected by diet in several ways. Becker, Taylor and Fuhrmeister (1947) and Koerner, Getz and Long (1949) report resistance to several infections in animals to be greatly affected by fortifying the diet with proteins and vitamins. (Nelson, Ven Nouhoys and Evans, 1947) found that increased protein levels decreased the pantothenic acid requirement of the rat. Bosse and Axelrod (1948) report delay in wound healing in deficiencies of pyridoxine,

TABLE 21.

Levels of nutrients in food intake of 234 (57 male, 177 female) patients suffering from periodontal disease as shown by proportion of allowances recommended by The Food and Nutrition Board, National Research Council (Rev. 1948).

% of NRC Standard		*0–24%*	*25–49%*	*50–74%*	*75–99%*	*100% plus*
		% Distribution of patients				
Protein	M	0	0	0	7	93
	F	0	0	2	15	84
Calories	M	0	2	25	58	16
	F	0	3	41	44	12
Calcium	M	0	9	25	25	42
	F	2	18	25	21	35
Phosphorus	M	0	0	3	30	67
	F	0	3	27	32	38
Iron	M	0	0	2	35	63
	F	0	2	27	37	33
Vitamin A	M	0	2	2	17	79
	F	0	2	10	17	71
Thiamine	M	2	9	56	28	5
	F	0	20	49	27	4
Riboflavin	M	3	2	9	32	54
	F	0	5	27	27	41
Niacin	M	0	0	0	2	98
	F	0	1	1	6	93
Ascorbic Acid	M	2	18	26	21	33
	F	2	12	23	12	51
% Carbohydrates derived from grains and refined sugars	M	0	16	75	9	—
	F	2	30	63	5	—
% protein derived from animal sources	M	0	4	61	35	—
	F	1	2	69	28	—
		Less than 20%	20–30%	30–40%	40–50%	50% plus
		% Distribution of patients				
% Calories derived from grains and refined sugars	M	2	19	46	26	7
	F	7	29	39	22	3

riboflavin and biotin. Mechanisms for these effects are suggested by the work on phagocytic and bone marrow response in deficiencies of ascorbic acid and protein by Nungester and Amers (1948) and Asirvadham (1948).

SUMMARY AND CONCLUSIONS

An appraisal of the dietary status of 234 patients with paradentosis has been made. 27% of the male patients and 44% of the female patients were found to consume less

than 75% of the National Research Council recommended daily allowance for total calories.

None of the males and 2% of the females consumed less than 75% of the National Research Council recommended daily protein allowance.

34% of the males and 45% of the females consumed less than 75% of the National Research Council recommended daily calcium allowance.

3% of the males and 45% of the females consumed less than 75% of the National Research Council recommended daily phosphorus allowance.

2% of the males and 29% of the females consumed less than 75% of the National Research Council recommended daily Iron allowance.

4% of the males and 12% of the females consumed less than 75% of the National Research Council recommended daily Vitamin A allowance.

67% of the males and 69% of the females consumed less than 75% of the National Research Council recommended daily Thiamine allowance.

14% of the males and 32% of the females consumed less than 75% of the National Research Council recommended daily Riboflavin allowance.

None of the males and 2% of the females consumed less than 75% of the National Research Council recommended daily Niacin allowance.

46% of the males and 37% of the females consumed less than 75% of the National Research Council recommended daily Vitamin C allowance.

ACKNOWLEDGMENTS

The author wishes to acknowledge his grateful thanks to Leland D. Jones, D.D.S., Lowell N. Peterson, D.D.S., and Alex J. Linck, D.D.S., for their cooperation in furnishing patients for this study; to Gordon N. Beckstead, Ph.D. for his statistical help, to William Ward Wainwright, D.D.S. for his helpful suggestions and painstaking review of the manuscript.

Grateful thanks are also due to my secretaries Miss Ether M. Rabinowitch whose helpful suggestions and gentle but persistent prodding have made this paper possible and to Miss LaVerne Davis for her many painstaking typings of the manuscript and tables.

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James Nuckolls, D.D.S.

Died April 19, 1952

Dr. James Nuckolls died of a coronary occlusion on April 19, 1952, at the age of 49. He is survived by his wife, Gladys, and a 14 year old son, Jimmy. Jim received his early education at Santa Cruz, California, and graduated from dentistry at the University of California with the class of 1927. Two years later he joined the teaching staff as an Assistant in Dental Anatomy, and by 1941 he became Professor and Chairman of the Division of Operative Dentistry. In 1947 he was appointed Chairman of the newly created Division of Preclinical Sciences and Professor of Oral Histology and Oral Pathology.

From the first, Jim showed a keen perspective and interest in basic research. His earliest publications dealt with the teaching and morphologic description of the deciduous teeth, and ultimately led in 1949 to the joint publication with Doctor Zeisz of a textbook in Dental Anatomy. Basic studies on tooth development and eruption, the histopathology, biochemistry and bacteriology of dental caries, and the periodontal lesion led to the publication of a great number of papers and syllabi.

Nuckolls' life was filled with service, not only to the University, but also to the dental profession and the public. He was elected a fellow and held membership in numerous professional and scientific organizations, among which were the California State and the American Dental Associations, the American College of Dentists, the International Association for Dental Research, the American Association for the Advancement of Science, the Society for Experimental Biology and Medicine, the American Academy of Periodontology, and the American Academy of Dental Medicine. With all his dental activities, he also found time to be an enthusiastic yachtsman. He won many medals for races on the San Francisco Bay and off the California Coast.

The loss of Jim will be seriously felt by all who had been associated with him.

H. E. Frisbie

Editorials

The William J. Gies Foundation for the Advancement of Dentistry, Inc.

On June 20, 1950 the William J. Gies Foundation for the Advancement of Dentistry, was incorporated as a permanent memorial to Dr. Gies in recognition of his more than 40 years of idealistic service to dentistry in education, science, research and literature.

Among his many contributions to the advancement of dentistry was the founding of the *Journal of Dental Research* in 1919. Like many such journals it had never been self-supporting and in 1936 an informal committee in New York undertook to raise a fund of $50,000, its chief purpose being to provide income to meet the recurring deficits. In announcing its objective the statement was also made that "If, at any time, the *Journal of Dental Research* should become self-supporting, the income from the Fund would be used for research or any other worthy object in dentistry".*

The efforts of the Fund raising committee continued for several years during which time more than 600 members of the dental profession and several dental organizations contributed to the Fund. The money so raised was invested in government bonds, having a present face value of $56,000.

Later the ownership of the Journal of Dental Research was transferred by gift to the International Association for Dental Research and in the course of time became self-supporting. Under these circumstances and following legal advice, it was decided to terminate the informal status of the Committee and to create a corporate organization to be known as "The William J. Gies Foundation for the Advancement of Dentistry, Inc." to which all funds in the hands of the Committee, were to be transferred. This has been done, and the Foundation given a tax exempt status. Since then, one anonymous donor, acting through Dr. Gies has made a gift of $10,000 to the fund. Subsequently, the Journal of Dental Research Inc., which had been inactive for many years and was about to be dissolved, received a personal gift of $3,642.87 from Dr. Gies. This generous sum was promptly donated to the Foundation by the directors of the corporation. Early in 1952 another gift from an anonymous donor, acting through Dr. Gies, added $6,257.13 to the fund. It will be noted that the two latter gifts total exactly $10,000.

By provision of its charter, only the income of the Foundation is to be expended except when otherwise specified by the donor. Prospects of further contributions to the Foundation are promising.

*Journal of Dental Research Vol. 15, p. 459, 1935-36.

As its name implies, the purpose of the Foundation is the *"advancement of Dentistry."* In line with this purpose several initial grants have been made, as follows: The International Association for Dental Research, The Dental Clinic of the Boys Club of New York Inc., the American Academy of Periodontology for a wider distribution of its journal, The First District Dental Society of New York, New York University College of Dentistry Library, and the Dental Editors Association for the publication of its Manual.

This is but the beginning of an organization that is destined to play an important part in the continued advancement of dentistry. Its perpetuity is assured. Added contributions (which are tax deductible) will increase its usefulness. It deserves and should have the wholehearted support of the dental profession and the public, who will be the chief beneficiaries of the Foundation. *A. H. M.*

Chlorophyll . . . Magic or Mirage?

Impartial observers have been amazed by the sudden popularity of chlorophyll-containing products and by the wonderful claims made for them. In 1915 when a German scientist Richard Wielstatter, was given the Nobel prize for his lengthy and detailed studies of chlorophyll, scientists thought his work to be "interesting" and "important," but no one visualized the time when chlorophyll would become a household word with its virtues widely acclaimed in the public press, and utilized as it is now in over 50 different products.

Studies on chlorophyll date far back. Sir Joseph Priestley wrote on "Photosynthesis" in 1722 and botanists have understood the role of chlorophyll in plant metabolism for generations. Also well known is the value of chlorophyll in promoting cell growth, and hastening the healing of chronic suppurative lesions. The ability of chlorophyll to combat unpleasant odors is a more modern finding, but even this fact about chlorophyll is not recent.

In this issue of the Journal can be found a short report on the effect on gingivitis of toothbrushing with three dentifrices, two of which contain chlorophyll. It is gratifying to note that eventually there was improvement from toothbrushing with any of the dentifrices. The evidence presented is quite clear that *in this study* the patients using chlorophyllin dentifrices showed more rapid improvement. The study was apparently carefully done, well controlled and thoroughly analyzed.

In fairness, it should be pointed out that this investigation was made on a group of boys with a high incidence of gingivitis. Also, the control dentifrice was not colored green, so that it was possible for the patient to know which dentifrice was being used. It is presumptive to assume that similar results would *or would not* be found in other groups of children, or in adults. This article is being published as a good research study in the hope that it will interest others to repeat and expand the investigation of effects of chlorophyllin.

Unfortunately, there have been many premature claims of the effectiveness

of chlorophyllin dentifrices made by companies selling them. Commercial concerns usually refuse to wait until all evidence is in, since the desire to sell a product usually overwhelms the more scientific attitude of waiting until all the facts are well established. Apparently the advertising departments have more influence in these companies than do their research men.

It is to be hoped that eventually the public will tire of grossly exaggerated advertising claims and refuse to purchase products simply because the "ad" writers are eloquent. Perhaps the time will come when the public will react unfavorably to exaggerated claims, realizing that products which have definitely established value need not be eulogized too feverishly. Apparently this Utopia is still in the future; until that time it is our opinion the dental profession should be kept informed and articles published as rapidly as possible so that the dental profession can read and discuss these new developments intelligently. It is our sincere belief that we can do the dental profession a service by publishing good articles on controversial subjects, realizing at the same time that there will be commercial concerns who use these articles to their own advantage.

Out of all the frenzy of advertising chlorophyllin dentifrices there may be benefit. Reports indicate that the public is buying—and we assume—using more toothpastes and powders than ever before. Oral hygiene is therefore probably improving, since these new chlorophyllin dentifrices are at least harmless, and perhaps beneficial.

TEACHING OF NUTRITION IN DENTAL SCHOOLS

The January 1952 issue of the *Journal of Periodontology* included (page 63) a letter from Dr. Alex J. Linck, who wrote as follows: "As you know nutrition is not taught in the medical and dental schools in this country. This fact has grave national significance." When the editor approved this letter for publication, he was curious to see if the statement quoted would go unchallenged, since courses entitled "Nutrition" *are* included in many of the dental and medical schools in the country.

The editor has not been besieged by letters challenging the statement, but he did receive some. Dr. Hamilton B. G. Robinson wrote as follows:

"I feel that statements such as this should not be allowed to pass unchallenged because nutrition is taught in most medical and dental schools of the United States. In some schools it does not have the formal title of "nutrition" but is taught in the courses in biological and physiological chemistry, as well as in other courses. At Ohio State University, for example, we do have a formal course in nutrition which was established under the leadership of Doctor J. B. Brown, professor of physiological chemistry and Director of our Institute of Nutrition of the Ohio State University. Doctor Brown presented a discussion of teaching of nutrition in dental schools at the 1932 meeting of the American Association of Dental Schools.

"When I was an undergraduate at University of Pennsylvania (1930-34) a course in nutrition was taught as such by Mrs. Anna de Bowes, and I believe that there are many other schools that began to teach nutrition during the 30s.

"Certainly, the medical and the dental schools have recognized the importance of nutrition and I believe it is unjust to allow statements 'that such courses are not taught in the schools' to pass unchallenged."

Two or three other teachers have expressed somewhat similar views. It is true that at one large midwestern university the subject of nutrition has been discussed for at least 30 years and perhaps longer.

Perhaps what Dr. Linck had in mind was that nutrition is not emphasized sufficiently in undergraduate teaching programs, and there would be few who would argue with that point of view. An understanding of nutrition is basic and cannot be ignored if satisfactory results are to be obtained in the treatment of diseases in general, and the treatment of periodontal diseases in particular. The Editor respectfully solicits good articles on nutrition for inclusion in the *Journal of Periodontology*.

President's Address

1951-1952

by JAMES E. AIGUIER, D.D.S., *Philadelphia, Pa.*

The American Academy of Periodontology today consummates one more successful year of its many years of achievement. It is my honor and pleasure on behalf of the officers and members of the Council, to extend their greetings and welcome you on the occasion of this thirty-sixth annual meeting in St. Louis. To those who unfortunately could not attend, we send our best wishes, and regret that they could not be here to participate in the good fellowship, and benefit from the scientific program. The sucess of this meeting should not be credited entirely to the efforts of the officers, members of council and committeemen—the entire membership rightfully and proudly shares in this accomplishment.

I would like to reiterate some of the history of the American Academy of Periodontology. In 1943 Dr. Samuel Parks suggested that the history of this organization should be written. No one had undertaken this important mission up to that time. After considerable deliberation it was decided that Dr. Arthur Merritt was the logical man to delegate for this task, and it is fitting that he should have been selected to undertake this work. Dr. Merritt is a past president of the American Academy of Periodontology, past president of the American Dental

Association, and has been active for more than fifty years in local and national dental affairs. He is an author of high reputation and is known internationally for his skill as a periodontist and for his important contributions to the literature on the subject. The history of the Academy appears in the *Journal of Periodontology*, July, 1947.

Fortunately, this task was undertaken about ten years ago when many of the original founders of the Academy were still active and available for information and especially our beloved Dr. Grace Rogers Spalding who offered her services and contributed much of the early material necessary to write a complete history. To those of you who have not read this article, I suggest you make it a "must" on your list of reading, and to those of you who have read it, may I suggest reading it again.

I would like to refer to some of the pertinent parts of this article which lead to the message I have to present to you today. The pioneers in the field of periodontology are mentioned in this article. They were few, to be sure, for in those days many members of our profession were rather skeptical about this particular phase of dentistry. However, among those early pioneers there were two women, Dr. Grace Rogers Spalding and Dr. Gillette Hayden. They had a vision that an organization should be formed that would bring together those practitioners whose chief interest was periodontia. The American Academy of Periodontology was formed in May, 1914, at Cleveland, with eighteen charter members, who represented ten states and Canada. This geographic allocation was of great importance to our founders and to the future of the Academy. More than one third of the founders were women, and all but three were by that time limiting their practice to oral prophylaxis and periodontia. The following officers were elected; President: Austin F. James, Chicago; 1st Vice President: Andrew J. McDonagh, Toronto; 2nd Vice President: R. G. Hutchinson, Jr., New York City; Secretary: Charles P. Wood, Detroit; Treasurer: Mary E. Alleyne, Detroit.

Dr. Austin James, the Academy's first president, passed away this year. He lived a full life and lived long enough to see many of the principles of the organization carried through to completion.

At the first annual meeting in Washington, D. C., November, 1914, Dr. James read his Presidential address, concluding with the statement: "You have made no mistake in selecting me as your first president if I am to be gauged by my enthusiasm for I am with you in heart and in mind and in body and soul." From what we know of Dr. James he lived up to his commitment for the next thirty-eight years, because he continued his interest until the time of his death, although he was not active in his later years. The following statement also was made at this first meeting: "Seventy-five percent of the adult population have periodontal inflammation that finally results in the loss of some or all of the teeth and seventeen of us in all the United States are interested enough to be here today." They had a report on nomenclature and we are still working with it.

The second meeting was held in Detroit, September, 1915 and President James in his address recommended a program of education, to include the profession

and the public; also, the publication of a Journal by the Academy. Thus, thirty-eight years ago, this Academy was organized and came into being and at that meeting Dr. John O. McCall submitted for consideration a draft of the Constitution and By-Laws, which was adopted.

It is significant that at this meeting today, thirty-eight years later, Dr. Roy O. Elam is submitting for consideration a revised draft of the Constitution and By-Laws. We all know why this had to come. The growth and changing order of this Academy has necessitated our developing and putting into effect a broader and more modern instrument of government whereby this organization can function more smoothly and efficiently.

The object of this organization, according to its illustrious founders, was to bring together a mutual group of dentists interested in periodontia, to exchange ideas and knowedge pertaining to this speciality which was becoming recognized, but practiced by few. There was a strong feeling that the specialized knowledge gained by this small group should be given to the profession and to the teaching institutions. That still is the policy of your organization today, but we now feel there should be a greater spread geographically.

Dental schools in those days were giving little or no attention to this phase of dentistry. After years of diligent work this organization has accomplished a great deal in the advancement of teaching periodontia. It is fitting today that some of the remaining members of that small but far seeing group can see the fruits of their labors. The teaching institutions have been most co-operative but have not reached perfection in accord with our standards or the standards of our founders. Their aim was a separate department to teach periodontia, staffed by a head of department, completely devoted to periodontia and with sufficient assistants to teach the student body. By making it a separate and distinct department, it would elicit the importance that rightfully belongs to it.

Dr. Dickson G. Bell, in his address at Atlantic City in 1950, suggested that a group of past Presidents of this Academy be appointed to study the problem of membership. Due to the years of service rendered to the Academy, these men were well qualified for the work. He states that each man has had at least six years of continuous experience as a Member of Council, then as President elect, as President and, finally, as Chairman of the Council. Dr. Edward B. Spalding was selected Chairman of that group and, due to his untiring efforts, he and his committee have completed their task. Among the many things accomplished, was the creation of a new membership form.

In a recent survey to determine the geograhic location of the members of this Academy, we find the following:

In the New England group there are four States without members of the Academy, namely, Maine, New Hampshire, Rhode Island and Vermont.

In the middle east section, Delaware and West Virginia have no representation and the State of Maryland has but two.

In the southeast group, Mississippi has no Academy member and Arkansas has only two.

In the southwest group, New Mexico is not listed.

In the central group, all States have members and a fairly good distribution.

In the northwest group there are five States—Idaho, Kansas, Montana, Utah and Wyoming—with no representation.

In the far west group there is one State—Nevada.

There are fourteen states without representation.

If any member should know of men in these areas, who meet the qualifications for Academy membership, it would be a good idea to propose them for this organization.

Representation in these states could arouse greater interest of the general practitioner in periodontia and thus stimulate the prevention, early diagnosis and treatment of periodontal disease.

Thus the Academy would be accomplishing one of its objectives.

There is a heavy concentration of members in the large cities viz: Boston 10; Chicago 13; (7 more in the suburbs); Cleveland 8; Los Angeles 9; (2 more in the suburbs); New York 26; Philadelphia 12; San Francisco 9; Washington, D. C., 8. There are, therefore, 104 members in 8 cities or an average of 13 per city.

In the large cities, we should go slow on recommendations for a while and try to locate new members in the outlying communities.

This brings up an important point, that many of our members have not assumed their responsibility for promoting dental health education of the public. I heartily recommend that you give more attention to this phase of your practice.

During the past thirty-eight years the Academy has accomplished considerable toward making periodontia a definite specialty in dentistry.

The *Journal of Periodontology* is recognized as one of the outstanding publications in the field of dental journalism. Dr. Grace Rogers Spalding, Editor of the Journal since it was founded in 1929 until her retirement in 1950, was responsible for making this possible. As you know, Dr. Maynard K. Hine, our present Editor, has continued the same policy and high quality of the publication, for which he is to be commended. According to our Editor, the *Journal* has had a most successful year but, to continue with its success, we must have an ever increasing circulation. The *Journal* subscription committee has accomplished a splendid piece of work, but they need the help of every member. If each member could bring in one subscription this coming year, we would have a much better situation. Please remember a subscriber does not have to be a member of the Academy.

At the first meeting of this Academy in 1914, a report on Nomenclature was presented. This all-important subject has had a definite place in our yearly program to the present time. Likewise, the Classification Committee has worked hard and diligently for some time to accomplish their goal. However,

we now have a workshop established devoted to Nomenclature and Classification and these combined Committees have accomplished a great deal over the past year.

The American Board of Periodontology was initiated by this Academy. It is doing very creditable work. The American Dental Association recognizes and accepts diplomates of this Board as specialists in the field of periodontia, and has considerable praise for the way it functions.

The Section of Periodontia in the American Dental Association is the result of the efforts of this Academy and here again we have our mark of distinction. The officers of this section have always been selected from the membership of the Academy.

The Officers, Members of the Council, and Committees have contributed much to the successful functioning of the Academy during the past year. The accomplishments that have been attained are due to their unselfish and untiring efforts. They have always been willing to suggest, advise and carry out any commitments that were assigned. The Annual Meeting runs so smoothly that few of us give much thought to the amount of planning and hard work on the part of the different Chairmen and their Committee members that make this possible. I owe a great debt of gratitude to each of them: The Committees on Program, Arrangements, Scientific Investigation, Clinics, Round-Table Luncheon, Entertainment and Publicity.

I could not finish stating my obligations without mentioning one of the hardest working individuals in this organization. He is a modest and retiring person, he does not have much to say—in fact, he says very little—but accomplishes much. He has his finger on the pulse of this organization and there is never a task too trivial or too great for him to undertake—and he does it so graciously. Without his help I would have had a difficult year as your President. My sincere thanks to Dr. Clarke Chamberlain, our able and efficient Secretary.

Here I would like to give a word of praise to The Kellogg Foundation and Dr. Paul Jesserik, Director; also, Dr. William Mann, Associate Director. The Kellogg Foundation, through the efforts of Dr. Jesserik, for the past several years has made it possible to hold the Academy Seminar at the University of Michigan, Ann Arbor. The Kellogg Foundation has not only made all facilities available, but has invited and paid our guest speakers for all these occasions, and I am expressing the sincere thanks and appreciation of the American Academy of Periodontology.

In conclusion, my sincere thanks to each and every one of you for the honor you bestowed upon me with the Presidency of the American Academy of Periodontology, and with your continued interest and effort this organization should remain one of the outstanding specialty groups, as it is only through the loyalty of the membership at large that any society can continue to grow in size, importance and accomplishment.

Report of the 36th Meeting of the American Academy of Periodontology

by CLARKE CHAMBERLAIN, *Secretary*

Those who attended our meeting in St. Louis, September 4-5-6, are well aware of the excellent meeting and those who could not attend were greatly missed.

The attendance was excellent. There were many guests and all are in accord with the excellent program and great credit is due to the Local Arrangements Committee, Co-Chairmen E. F. Allen and J. A. Jacobsmeyer.

Interest in the Academy and its activities is most gratifying. The groundwork laid for the organization and its dedication to, "meet and work together without prejudice for the scientific investigation of dental caries and periodontics, that the practice of oral prophylaxis and periodontia be encouraged and that the general profession may be fully acquainted with the results that can be obtained."

The very active and increasing interest of the dental profession is a compliment to the pioneers in this field and the Academy should accept this as a compliment to these pioneers and those who are carrying on the tradition of the Academy. One of the fruits of their efforts is exemplified in the June and July issues of the American Dental Association Journal which gave two complete issues to periodontia.

An interesting observation from the Secretary's office is that there have been no resignations other than those of retirement (two), which is significant of the value which members place on their affiliation with the American Academy of Periodontology.

The services of B. O. A. Thomas, "pinch-hitting" for Harold Ray, Chairman of the Program Committee, who could not attend because of illness, is greatly appreciated. His energy and ability helped make the St. Louis meeting second to none in the history of our organization.

Illness in the family of James Westbrook, Jr. prevented him from attending. John McKenzie and the rest of the Clinic Committee did an excellent job.

Credit is due for the stupendous job performed by Roy Elam as Chairman of the Constitution and By-Laws Committee, who submitted a new Constitution and By-Laws. This instrument was accepted with very little change or controversy.

President James E. Aiguier presided at the meeting masterfully. His drive and geniality exemplify the spirit of this fine group. The Academy owes him a cordial vote of gratitude.

Seventy-three new members were extended invitations to become members, which represents nominations for two years. We welcome the following new members:

Ainsberg, Alvin D.	Medical Arts Bldg., Baltimore, Md.
Alexander, Leonard C.	2732 N. 72nd St., Milwaukee, Wis.
Allred, James F.	204 Medical Arts Bldg., Atlanta, Ga.
Armstrong, Charles B.	239 Laurel Ave., San Diego, Cal.
Barkley, Joseph	16114 E. Warren St., Detroit, Mich.
Banks, Ernest L.	830 Chandler Bldg., Atlanta, Ga.
Beech, Harry J.	1726 Eye St., N.W., Washington, D. C.
Beesemyer, Louis	415 Camden Drive, Beverly Hills, Cal.
Bentman, Julius	155 Chestnut, Lancaster, Pa.
Bloom, Jack	482 Beacon St., Boston, Mass.
Bovik, Ellis G.	Professional Bldg., Monterey, Cal.

Brown, Donovan ..... 311 E. Chicago St., Chicago, Ill.
Butler, Clarence ..... 450 Sutter St., San Francisco, Cal.
Conant, Julian R. ..... 6447 Fairfax Rd., Chevy Chase, Md.
Chilton, Neal ..... 225 State St., Trenton, N. J.
Carraza, Fermin ..... Callao 262, Buenos Aires, Argentina
Dickman, Celia ..... 1 W. 64th St., New York, New York
Downie, Elizabeth ..... 1421 David Whitney Bldg., Detroit, Mich.
Eskow, Alexander ..... Medical Arts Bldg., Baltimore, Md.
Everett, Frank ..... 921 Selling Bldg., Portland, Oregon
Fallis, Reginald J. ..... c/o Madigan Army Hosp. Dental Clinic, Tacoma, Washington
Finley, Charles W. ..... 3213 27th St., Lubbock, Tex.
Flaschner, Abraham ..... 419 Boylston, Boston, Mass.
Gehl, Andrew P. ..... 945 N. 12th St., Milwaukee, Wis.
Gibbs, John W. ..... 215 Professional Bldg., Charlotte, N. C.
Gold, Arthur ..... 26 Maple St., Springfield, Mass.
Gravlee, Levert ..... Medical Arts Bldg., Birmingham, Ala.
Haas, Vernon J. ..... 214 E. Washington St., Bloomington, Ill.
Hamblen, Tolar N., Jr. ..... 2400 River Oaks Blvd., Houston, Tex.
Harris, Irvin ..... 55 E. Washington, Chicago, Ill.
Holbrook, Edward G. ..... 509 Medical Arts Bldg., Baltimore, Md.
Holmes, Nancy J. ..... 1426 Medical Arts Bldg., Dallas, Tex.
Holmes, Samstone ..... 4951 25th Ave., S. Arlington, Va.
Howell, James B. ..... 510 W. Market St., Greensboro, N. C.
Ingle, John I. ..... University of Washington School of Dentistry, Seattle, Wash.
Jacob, Joseph ..... 1108 E. 10th St., Kansas City, Mo.
Johnson, Carl ..... 436 Medical Arts Bldg., Tacoma, Wash.
Kopp, Aloyse E. ..... 324 E. Wisconsin Ave., Milwaukee, Wis.
Kreider, Raymond ..... 708 Daniel Baldwin Bldg., Erie, Pa.
Lane, Thomas B. ..... 621 58th St., Kenosha, Wis.
Leigh, Lewellyn ..... 511 Byron, Palo Alto, Cal.
Manser, Julien G. ..... 502 S. Bryn Mawr, Albuquerque, N. M.
Marshall-Day, Cyril ..... 370 Commonwealth, Boston, Mass.
Musgrave, William A. ..... 525 S. Division St., Ann Arbor, Mich.
Nabers, John M. ..... 328 Hamilton Bldg., Wichita Falls, Tex.
Neilson, John W. ..... 324 Tegler Bldg., Edmonton, Alberta, Can.
Ogilvie, Alfred L. ..... School of Dentistry, Univ. of Washington, Seattle, Washington
Paulsen, Albert ..... 1220 16th St., Washington, D. C.
Perschbacher, Ray G. ..... 104 Medical Center Bldg., Denver, Colo.
Peterson, William A. ..... 1447 Medical Arts Bldg., Minneapolis, Minn.
Quinn, William T. ..... 14411 E. Jefferson, Detroit, Mich.
Reader, Zar ..... Henry Ford Hospital, Detroit, Mich.
Reed, Joseph Y. ..... 3531 Fairmount St., Dallas, Tex.
Restarski, Joseph ..... 1757 W. Harrison St., Chicago, Ill.
Robinson, James R. ..... 730 Toledo Medical Bldg., Toledo, O.
Roeling, Loyola ..... 632 Maison Blanche Bldg., New Orleans, La.
Rosenberry, Robert Lee ..... 450 Sutter St., San Francisco, Cal.
Schaffer, Erwin ..... 834 LaSalle Bldg., Minneapolis, Minn.
Schlick, John M. ..... 945 N. 12th St., Milwaukee, Wis.
Schmidt, William G. ..... 55 E. Washington St., Chicago, Ill.
Schoen, David ..... 38 N. Milburn Ave., Baldwin, L. I., N. Y.
Scopp, Irwin W. ..... 4 Stuyvesant Oval, New York, N. Y.
Scott, Francis T. ..... 307 Medical Arts Bldg., Jacksonville, Fla.
Sexton, William ..... Bristol, Tenn.
Speer, John H. ..... 1002 Park Bldg., Pittsburgh, Pa.
Sullivan, Daniel A. ..... 555 Ocoee St., N.W., Cleveland, Tenn.
Thompson, Lee R. ..... 801 O'Hanlon Bldg., Winston-Salem, N. C.
Walford, Wallace F. ..... 1414 Drummond St., Montreal, Quebec, Can.
Ward, A. W. ..... 450 Sutter St., San Francisco, Cal.
Wick, Ashton W. ..... 724 New York Ave., Sheboygan, Wis.
Wilkinson, Bruce ..... 505 Citizens' Bldg., Tyler, Tex.
Williams, Russell ..... 565 W. Neshannock, New Wilmington, Pa.
Wolfsohn, Robert S. ..... 175 Linwood Ave., Buffalo, N. Y.

The following are the Academy officers for 1953:

President: Roy O. Elam
President-Elect: Harry Lyons
Secretary: Clarke E. Chamberlain
Treasurer: Raymond E. Johnson

Council

James E. Aiguier, Chairman
Roy O. Elam, President
Harry Lyons, President-Elect
Clarke E. Chamberlain, Secretary
Raymond E. Johnson, Treasurer
Robert G. Kesel
Donald A. Kerr
Harold G. Ray
James C. Westbrook, Jr.
Joseph L. Bernier
Stanley C. Baker

Fellowship Committee

James E. Aiguier
Arthur H. Merritt
Alvin W. Bryan
M. M. Bettman
Robert L. Dement
M. Harry Garvin
Edgar D. Coolidge

American Board of Periodontology

Arthur H. Merritt
Harold J. Leonard
Raymond E. Johnson
M. M. Bettman
Samuel R. Parks
Clarke E. Chamberlain

Journal of Periodontology

Maynard K. Hine, Editor
Grace Rogers Spalding, Editor Emeritus

COMMITTEES OF GENERAL ASSEMBLY

Constitution and By-Laws

James P. Hollers, Chairman	3 years
Richard Chace	2 years
D. P. Nachazel	1 year

Membership

Hunter S. Allen, Chairman	3 years
Dickson G. Bell	3 years
Edward G. Spalding	2 years
Carlos H. Schott	2 years
Isador Hirschfeld	1 year

Education

Frank E. Beube, Chairman	3 years
C. N. Sanger	1 year
Dorothea F. Radusch	2 years

Research in Periodontology	
Harold G. Ray, Chairman	3 years
Irving Glickman	2 years
S. Leonard Rosenthal	1 year
Scientific Sessions	
Robert G. Kesel, Chairman	3 years
Donald A. Kerr	2 years
B. O. A. Thomas	1 year
Ethics	
Mildred W. Dickerson, Chairman	3 years
Lowell N. Peterson	2 years
Craft A. Hopper	1 year
Nomenclature and Classification	
Joseph L. Bernier, Chairman	3 years
Henry M. Goldman	2 years
Hermann Becks	1 year
Foreign Relations	
Balint Orban, Chairman	
Edgar Coolidge	
Samuel Miller	
Jose Palancar	
COUNCIL COMMITTEE	
Budget	
Justin D. Towner, Chairman	1 year
Harry T. Wood	3 years
S. C. Baker	2 years

The Secretary is most grateful for the wonderful cooperation of all officers, councilmen and committee men. It is a pleasure to serve this fine organization with such able assistance and understanding from its governing body and enthusiastic members.

Announcements

University of Pennsylvania School of Dentistry
offers a Course in

PERIODONTAL THERAPY

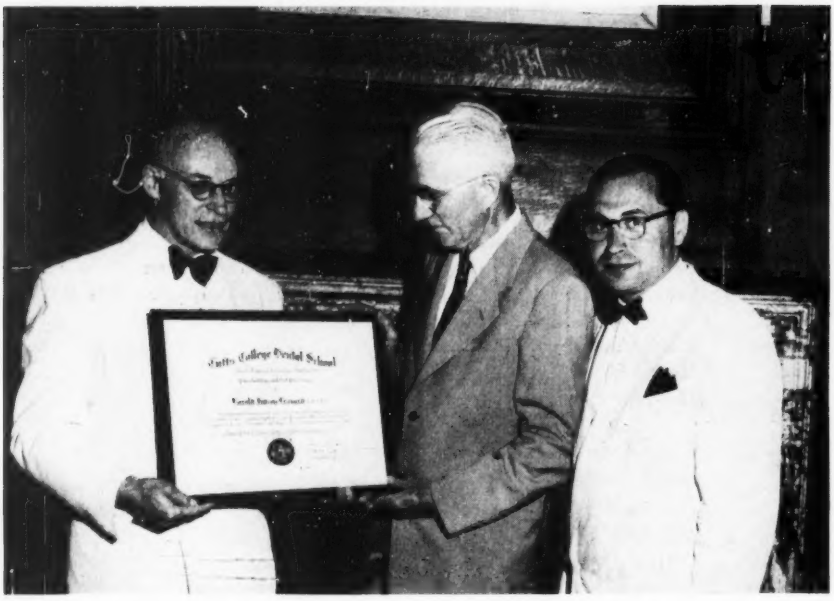
by

Henry M. Goldman, D.M.D., and Associates

Five day Course—continuous—8, 9, 10, 11, 12 December 1952.

The objective of this course is to acquaint the practitioner with the importance of Periodontics in the general practice of dentistry. The etiology and diagnosis of periodontal diseases will be stressed. The various technics of periodontal therapy will be discussed from a point of view of indications, contra-indications, and methods. Case planning will be emphasized. This course includes lectures, illustrations with lantern slides, and clinical demonstrations.

Anyone interested should write Director, Postgraduate Courses, School of Dentistry, University of Pennsylvania, 4001 Spruce Street, Philadelphia 4, Pa.



PRESENTATION OF TUFTS AWARD AT EASTOVER, LENOX, MASS.
Left to right: Dean C. D. Marshall-Day, Dr. Harold J. Leonard, recipient of award, Prof. Irving Glickman, Director of Post Graduate Studies of Tufts College Dental School.

COURSES OFFERED AT TUFTS COLLEGE

The courses in Periodontology and Oral Pathology listed below will be presented throughout the academic year of 1952 and 1953 at Tufts College Dental School. Information may be obtained by writing to the Director of Postgraduate Studies, Tufts College Dental School, 136 Harrison Ave., Boston, Mass.

Surgical Pathology of the Oral Cavity and Adjacent Structures. Each Thursday afternoon for eight weeks from Oct. 2 to Nov. 20, 1952—1 p.m.-5 p.m. Tuition $100.00. Dr. Irving Meyer, Dr. Irving Glickman.

A Course and Series of Diagnostic Clinics in Oral Pathology. *Evening course* each Monday evening for eleven weeks from Nov. 10, 1952 to Jan. 19, 1953—6:30 p.m. to 9 p.m. Tuition $100.00. Dr. Max Jacobs and Staff.

Participation Course in Periodontology. Each Monday for ten weeks from Oct. 6 to Dec. 8, 1952 and Feb. 23 to April 27, 1953. Tuition $150.00. Dr. Irving Glickman and Staff.

Participation Course in Periodontology—April 20-24, 1953. Tuition $100.00. Dr. Irving Glickman and Staff.

The Kirkland Gingivectomy Technique—May 11-15, 1953. Tuition $100.00. Dr. Olin Kirkland.

Occlusal Equilibration. Each Monday for five weeks from Jan. 12 to Feb. 5, 1953. Tuition $100.00. Dr. Edward T. Fischer.

PERIODONTIA SYMPOSIUM
offered by

University of Illinois College of Dentistry
February 12, 1953

"The Practical Approach to the Periodontal Problems" will be discussed at the University on Thursday, February 12, 1953, from 9:00 a.m. to 9:00 p.m. The faculty consists of Dr. Balint Orban (Colorado Springs, Colorado), Dr. W. G. McIntosh (Toronto, Ontario), Dr. Lewis Fox (South Norwalk, Connecticut).

Anyone interested should write Dr. Saul Levy, Coordinator Postgraduate Studies, Extension Division, University of Illinois College of Dentistry, 808 South Wood Street, Chicago 12, Illinois.

TEMPLE UNIVERSITY ANNOUNCES POSTGRADUATE COURSE IN OCCLUSO-REHABILITATION

"Occluso-Rehabilitation" under the direction of Dr. Louis Alexander Cohn of New York City is a six-day course beginning February 2, 1953. This will be a concentrated week of lectures and clinical demonstrations on the art and science of Occluso-Rehabilitation. Many of the techniques and instruments to save time for the operator, technician, and patient will be demonstrated and applied to practical cases. Clinical cases will be operated upon and carried out to completion. Enrollment limited to twenty-five. Cost $300.00.

Applications can be made to:

Dr. Louis Herman
Director of Postgraduate Studies
Temple University School of Dentistry
3223 North Broad Street
Philadelphia 40, Pennsylvania

AMERICAN ACADEMY OF DENTAL MEDICINE ANNOUNCES MID-WINTER MEETING

The American Academy of Dental Medicine will hold its annual Mid-Winter Meeting and Luncheon at the Hotel Statler in New York City on Sunday, December 7, 1952 at 12:30 P.M.

A symposium on "Pain" will be presented following the Luncheon. All members and interested dentists and physicians are invited. For program and reservations address: Dr. W. M. Greenhut, National Secretary, 124 East 84th Street, New York 28, N. Y.

The Academy was organized in 1945 "to promote the study and dissemination of knowledge of the cause, prevention and control of disease of the teeth, their supporting structures and appendage parts, and related subjects; and to foster and promote a better scientific understanding between the fields of dentistry and medicine." It has an international membership of more than five hundred.

TEMPLE UNIVERSITY SCHOOL OF DENTISTRY
PERIODONTICS

This course is offered by Dr. Jacob T. Rothner and staff to give the general practitioner the most recent developments and changed concepts in the modern practice of periodontics.

The course will start with considerations of the normal tissues as a basis, and go on to the changes which may be manifested. The approach to the analysis of the causes, diagnosis, and treatment of the diseases of the supporting tissues will be of a practical nature. There will be laboratory practice and clinical demonstration in occlusion, instrumentation, and home-care. The relationship with laboratory reports, bacteriology, and medical practice will be explained in detail. Authorities in associated fields will take part in the instruction and the whole picture will constantly be correlated.

Instruction will be by lecture, clinical demonstration, laboratory practice, and informal discussion.

Course will be given for seven successive Thursdays, beginning February 12, 1953 from 9:00 A.M. to 4 P.M. The fee is $175.00, and the course is limited to fifteen.

WORLD CONFERENCE ON ENDODONTICS

The School of Dentistry, University of Pennsylvania announces a World Conference on Endodontics, which will be held 21 to 27 June 1953. Participating in this Conference will be outstanding leaders in the field of Endodontics, such as Dr. Francisco Pucci of Montevideo, Uruguay; Dr. W. Stewart Ross of London, England; Dr. B. Nygaard Ostby of Oslo, Norway, and others from Canada and the United States. The Conference will be under the direction of Dr. Louis I. Grossman. The tuition fee for this course is $100.00. Applicants should make direct inquiries to—Postgraduate Courses, School of Dentistry, University of Pennsylvania, Philadelphia 4, Pennsylvania.

CALIFORNIA ACADEMY OF PERIODONTOLOGY

The 1952-53 officers of the California Academy of Periodontology are as follows:

President	Dr. J. H. Bajuk 1551 Webster St. Alameda, California
Vice-Pres.	Dr. Herbert E. Ward 1315—23rd Ave. San Francisco, California
Treas.	Dr. John Conroy 240 Stockton St. San Francisco, California
Rec. Sec.	Dr. Francis J. Fraher 1246 Castro St. San Francisco, California
Financial Secretary	Dr. Elmer G. Smith 1361 Park St. Alameda, California

People who are interested in attending meetings may receive information by writing the Recording Secretary.

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BD. PER. GEN.